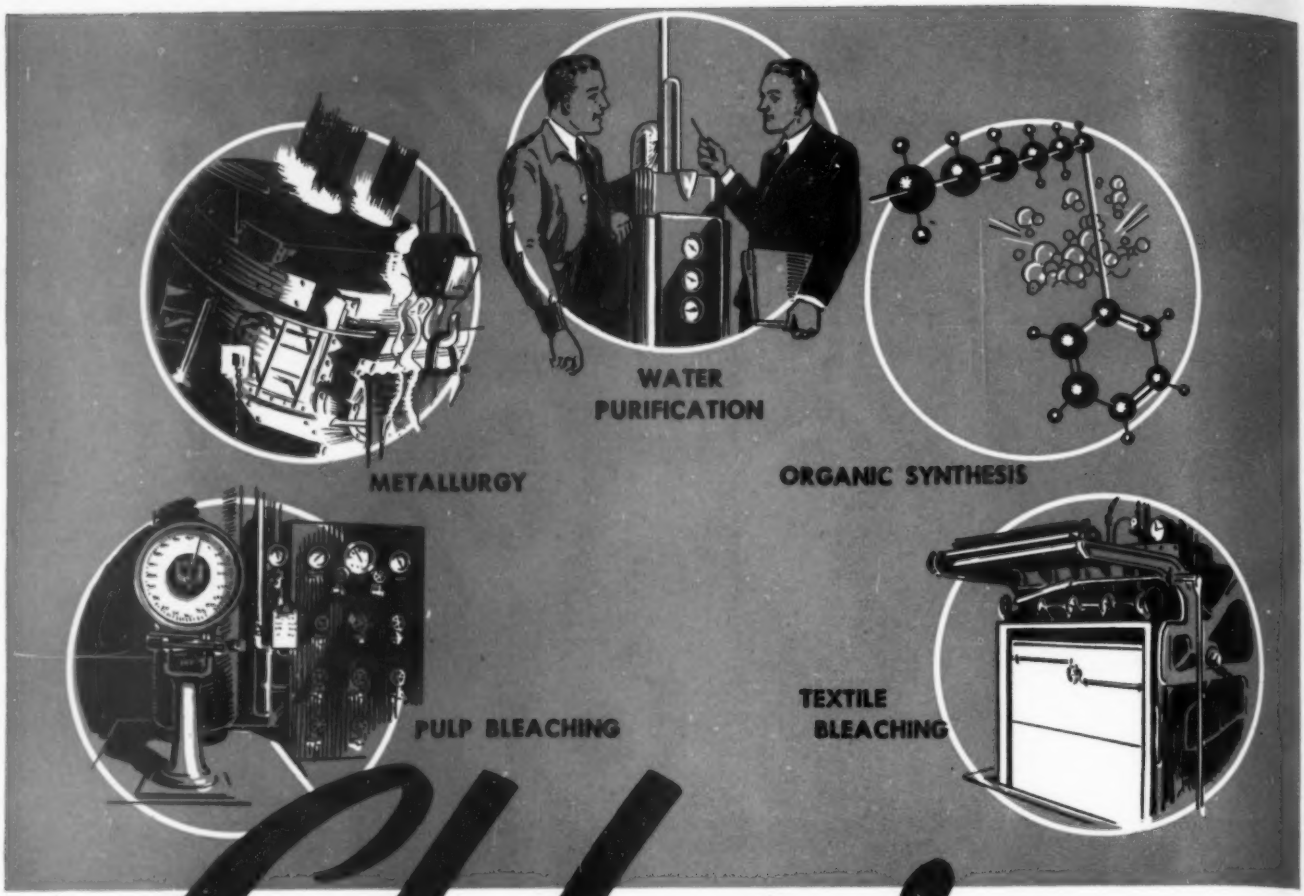
WATER WORKS & SEWERAGE

HBP ABC

1942'S VERSION OF "A HOUSE BESIDE THE ROAD"
THE SEWAGE TREATMENT PLANT OF
COKATO, MINNESOTA



Chlorine

CHEMICAL SERVANT EXTRAORDINARY

In a century and a half of industrial development chlorine has become one of man's most useful chemical servants. Its first commercial application was made in 1799 by Charles Tennant, who manufactured bleaching powder for textile manufacturers.

In 1800 Tennant produced a few tons of bleaching powder. Today chemical plants in America are turning out well over a million tons of chlorine—much of which has been drafted for wartime military and industrial effort.

Penn Salt pioneered in the production of liquid chlorine, being first to manufacture it in commercial quantities. The first tank car of this essential chemical was shipped from our Wyandotte, Michigan, works in 1909. Our operations have continued to expand since that time until today our Wyandotte and Tacoma works are among the largest chlorine producers in the United States.

As a result of our increased production of chlorine for today's wartime uses, we are able to look forward to the promise of even greater peacetime possibilities.

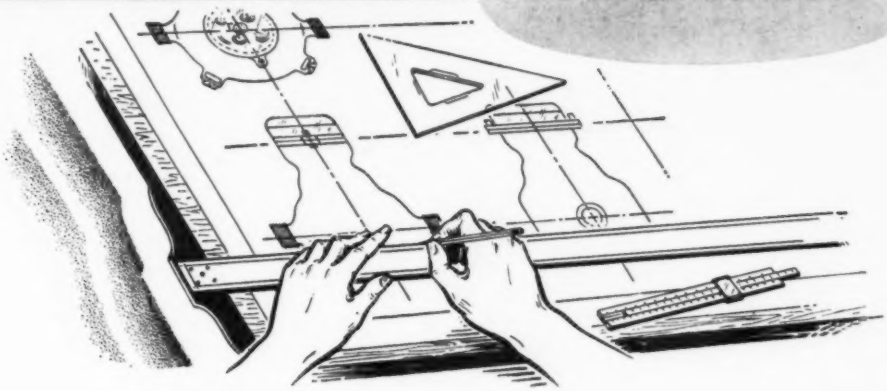
PENN SALT *Chemicals*

CHEMISTRY IS THE KEYSTONE OF INDUSTRY

Pennsylvania Salt Manufacturing Company, 1000 Widener Building, Philadelphia, Pa.
Branch Offices: New York • Chicago • St. Louis • Pittsburgh • Wyandotte • Tacoma

THINKING ABOUT TOMORROW?

WE ARE



THE wonders of tomorrow will come from the germ of today's genius. Under the feverish pressure of war, developments are taking place that, in less strenuous times, might have required years to realize. Already, technically speaking, our pre-Munich world is an antiquity. The Water Works World of tomorrow, too, will benefit from the effects of this precedent shattering impulse.

The Engineering, Research and Development Departments of the Pittsburgh Equitable Meter Company and its National Meter Division are thinking ahead of the times. On the drawing boards new designs are taking form. In the laboratories experimental models are being put through their paces. With the Victory and a return to normal times, the results of today's research will be apparent in tomorrow's Pittsburgh-National Meters.

WE'VE THOUGHT ABOUT TODAY, TOO

THE *Empire* VICTORY METER

Top measurement value in so-called War Model Meters is provided by the Empire Victory and the Pittsburgh Ironside. Both have fully rust-proofed cast iron cases; both are fitted with the Pittsburgh-National developed molded glass register box; both conserve over 70% of the bronze normally used in the construction of meters of this size. After the emergency is over, these meters can be readily converted to bronze cases if desired.

The Empire Victory Meter employs the time-tested, oscillating piston principle of measurement, using the famous Empire balanced piston. The Pittsburgh Ironside Meter is of the popular disc type, having the same inner-working mechanism that has been proven in thousands of Pittsburgh Arctic and Tropic Meters. Both are accurate measuring instruments, each possessing its own individual characteristics. Together they provide the necessary types to handle practically every domestic meter requirement or preference of water works men.

THE PITTSBURGH IRONSIDE METER

PITTSBURGH-NATIONAL METERS

THE MOST COMPLETE LINE OF WATER METERS IN THE WORLD

PITTSBURGH EQUITABLE METER COMPANY

NEW YORK · BROOKLYN · DES MOINES · MEMPHIS · OAKLAND · TULSA · CHICAGO · BOSTON

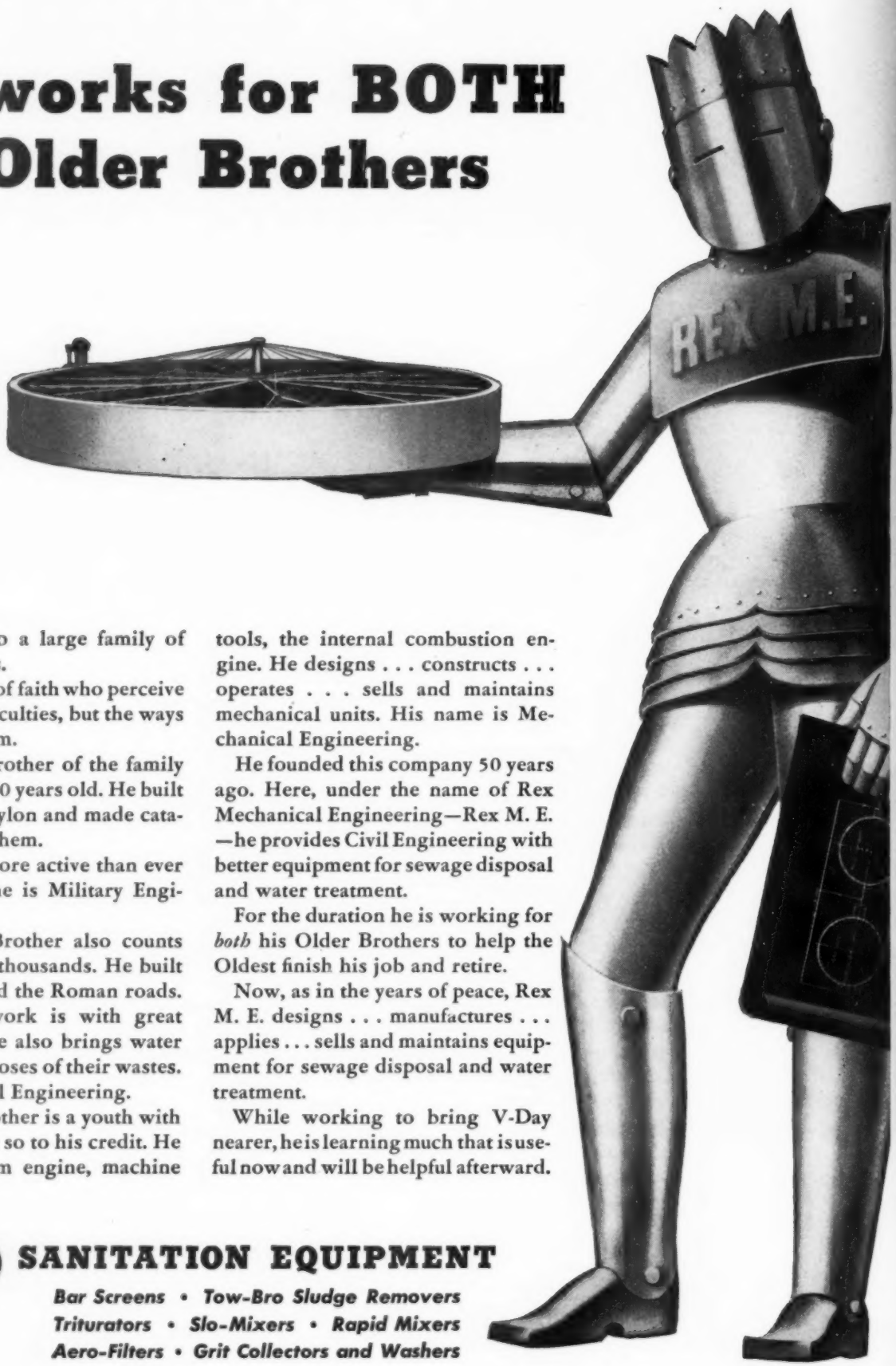
MERCO NORDSTROM VALVE COMPANY
Main Offices, Pittsburgh, Pa.

NATIONAL METER DIVISION, Brooklyn, N. Y.

KANSAS CITY · PHILADELPHIA · SAN FRANCISCO · LOS ANGELES · SEATTLE · HOUSTON · COLUMBIA · BUFFALO

WATER WORKS & SEWERAGE, February, 1943. Volume 90, Number 2. Published monthly by Gillette Publishing Co., 330 South Wells Street, Chicago, Ill. Per copy, 25c. Subscription rate. United States, $2.00 per year; Canada, $2.00 per year; Foreign, $3.00 per year. Entered as Second Class Matter, June 2, 1931, at the Post Office at Chicago, Ill., under Act of March 3, 1879.

He works for BOTH his Older Brothers



He belongs to a large family of wonder workers.

They are men of faith who perceive not only the difficulties, but the ways to surmount them.

The Oldest Brother of the family is more than 5000 years old. He built the walls of Babylon and made catapults to breach them.

Today he is more active than ever before. His name is Military Engineering.

The Second Brother also counts his years by the thousands. He built the Pyramids and the Roman roads. His principal work is with great structures, but he also brings water to cities and disposes of their wastes. His name is Civil Engineering.

The Third Brother is a youth with only a century or so to his credit. He created the steam engine, machine tools, the internal combustion engine. He designs . . . constructs . . . operates . . . sells and maintains mechanical units. His name is Mechanical Engineering.

He founded this company 50 years ago. Here, under the name of Rex Mechanical Engineering—Rex M. E. —he provides Civil Engineering with better equipment for sewage disposal and water treatment.

For the duration he is working for *both* his Older Brothers to help the Oldest finish his job and retire.

Now, as in the years of peace, Rex M. E. designs . . . manufactures . . . applies . . . sells and maintains equipment for sewage disposal and water treatment.

While working to bring V-Day nearer, he is learning much that is useful now and will be helpful afterward.

REX **SANITATION EQUIPMENT**

Bar Screens • Tow-Bro Sludge Removers
Triturators • Slo-Mixers • Rapid Mixers
Aero-Filters • Grit Collectors and Washers

CHAIN BELT COMPANY OF MILWAUKEE

Lithographed on stone by Edward A. Wilson for U. S. Pipe & Foundry Co.

The *number-one* job of our research technicians is developing processes by which we can make still more products, in addition to cast iron pipe, necessary to the winning of the war. In so doing, we are fortunate in having our standard product at its peak of development. We manufacture cast iron pipe in accordance with the American Water Works Association specifications—American Gas Association specifications—Federal Government Specification W. W.-P-421—as well as in accordance with the Law of Design recently adopted by the American Standards Association. In addition, we are fully prepared to manufacture cast iron pipe in accordance with specifications which may be written for specific conditions.

U.S. cast iron PIPE

U. S. PIPE & FOUNDRY CO.

General Offices: Burlington, N. J.

Plants and Sales Offices throughout the U. S. A.

TIGHT-CLOSING, EASY OPERATING TOUGH VALVES FOR TOUGH SPOTS

A 48" National Gate Valve

A COMPLETE LINE OF GATE VALVES FOR WATER WORKS INSTALLATIONS

You can specify National Gate Valves with full assurance that their time-tested designs and husky construction will operate with fool-proof dependability. The half century record of the National Machine Works in the engineering and manufacture of water works and sewage plant equipment is an unwritten guarantee of satisfaction.

National Gate Valves are built strictly in accordance with the full specifications of the American Water Works Association. They incorporate constructions from which years of experience have eliminated errors in design leading to faulty operation.

For your convenience in obtaining speedy service, the standardized and smaller gate valves are carried in stock. Special constructions to meet your own particular needs will be developed promptly by our engineering staff.

Estimates and engineering counsel are available to you at all times. Write for further information.

NATIONAL

MACHINE WORKS

1559 N. Sheffield Ave., Chicago, Illinois

FOR OVER 50 YEARS

Sincerely yours*

HAS BEEN PROUDLY INSCRIBED, IN EFFECT IF NOT IN FACT, ON THOUSANDS OF BUILDERS FLOW METERS AND CONTROLLERS!

A popular member of the Builders family

Type E Direct-Acting Filter Effluent Controller

Features Include:

precise, sensitive control; compact design; powerful "floating piston" actuation; low loss of head; elbow outlet or straight-through design; single blade vane-type control valve; and the use of the basic Venturi Tube.

Write for Bulletin 321-*A*

Back in the old days, second-rate Roman sculptors who made unsightly nicks in the marble would secretly patch up the flaws with a mixture of wax and marble dust. These patches would drop out later on and honest artists suffered so much that they began labelling their handiwork "Sine Cera" (i. e. "Without Wax"); from this we derive our word "sincere" meaning honest, genuine, real.

ARMY E NAVY
AWARDED AUG. 1st 1942

BUILDERS-PROVIDENCE, INC.

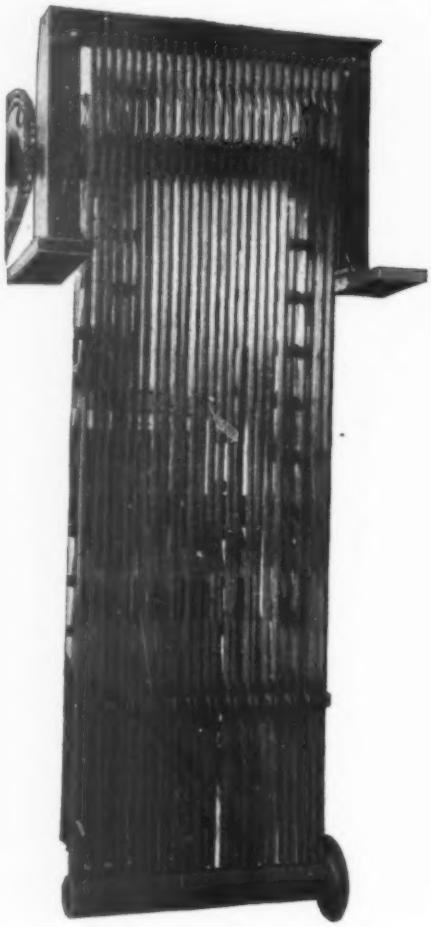
Est. 1820 • DIVISION OF BUILDERS IRON FOUNDRY • *Inc. 1853*

37 CODDING STREET • PROVIDENCE, R. I.

BUILDERS
WATER AND SEWAGE WORKS
Equipment

"AMERICAN" PUMP SCREEN

MECHANICAL TYPE



Installation showing upstream side of screen and suction pipe

SELF SHARPENING—The hollow ground cutting impeller is self sharpening and does not require constant care to keep the screening device from flooding out.

RANGE—This bar screen will handle the greatest range in flow without effecting operating conditions.

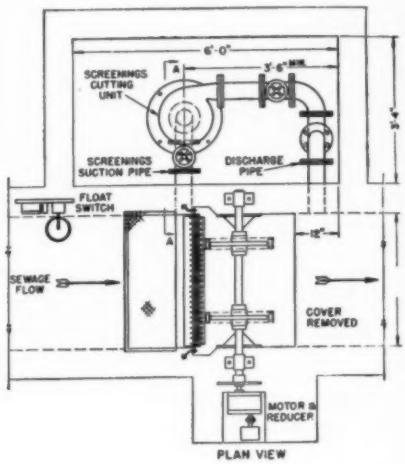
DEPENDABILITY—Power failures do not throw the screen out of operation as the screening action does not depend alone upon the operation of the cutter.

SIMPLICITY—The cutting impeller is a simple unit that may be easily removed for inspection and resharpens itself until the very hard metal on the cutting edges is gone.

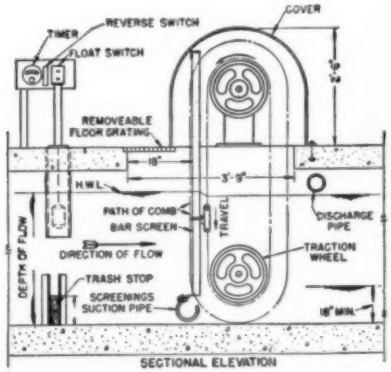
LONGEVITY—The cutting operation, being intermittent, is confined to less than two percent of time per day.

ECONOMICAL OPERATION—Altho the motor driving the cutting pump is relatively large, its total energy consumption is small because it operates less than 2 percent of time per day.

Cutting Impeller



PLAN VIEW



SECTIONAL ELEVATION

THE "AMERICAN" PUMP SCREEN

is a working combination of a bar screen and cutting pump. Solids are screened from the sewage, discharged from the screen to suction trough of cutting pump, cut into fine particles and passed on with the sewage.

Buy American

AMERICAN ESTABLISHED 1868

THE AMERICAN WELL WORKS

AURORA ILLINOIS

MANUFACTURERS OF

Pumping,—Sewage Treatment,—

and Water Purification Equipment

BULLETS WON'T STOP 'EM—

BUT HTH WILL!

AMONG the deadliest enemies of U. S. troops are *water-borne diseases*. Invisible killers — whose "combat divisions" run into the billions! They spread typhoid, dysentery and other epidemics that can cripple or wipe out an entire army. But thanks to the skill and industry of the Medical Intelligence Division of the United States Army, our troops can take the field well prepared to combat these unseen assassins.

Potent weapon in the battle against bacteria is Mathieson HTH and other dry chlorine carriers. These quick-acting bactericides are the active sanitation principle employed by the Army's portable water purification units. When added to water, they release germ-killing chlorine — making the water safe to drink!

HTH is also used to purify drinking water at training centers and other military establishments. Additional quantities of HTH are required to flush water mains before they are put into use . . . and to render the disposal of sewage safe and sanitary.

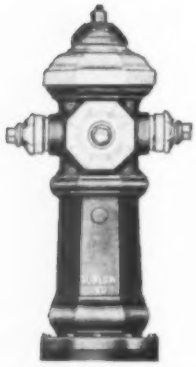
U. S. Army portable water purification unit in action on the bank of a stream. In the circle, at the left of the chlorinator, a 5-lb. can of Mathieson HTH "in service"! (Photo #130812, U. S. Army Signal Corps).

As a result of its importance in safeguarding the health of our armed forces, the distribution of calcium hypochlorite is now rigidly controlled by the W. P. B. That means Mathieson must give our armed services first call on available supplies. But it also means that the U. S. isn't taking any chances with disease germs — the greatest leveller of armies the world has ever known!

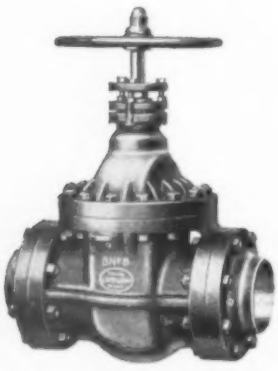
THE Mathieson Alkali Works (INC)
60 E. 42ND ST., NEW YORK, N. Y.

LIQUID CHLORINE . . . HTH . . . SODA ASH . . . CAUSTIC SODA . . . BLEACHING POWDER . . . AMMONIA, ANHYDROUS and AQUA . . . BICARBONATE OF SODA . . . PH-PLUS (FUSED ALKALI) . . . DRY ICE . . . CARBONIC GAS . . . SYNTHETIC SALT CAKE . . . SODIUM CHLORITE PRODUCTS

PRIORITIES . . .
a necessary blessing!



Ludlow Hydrant



Ludlow Gate Valve

A Necessary Evil?—this was our first impression of the Priority idea and its restrictions on buying, manufacturing and selling. But as we saw America answer the Axis threat, we came to regard the pinch of Priority as a Necessary Blessing!

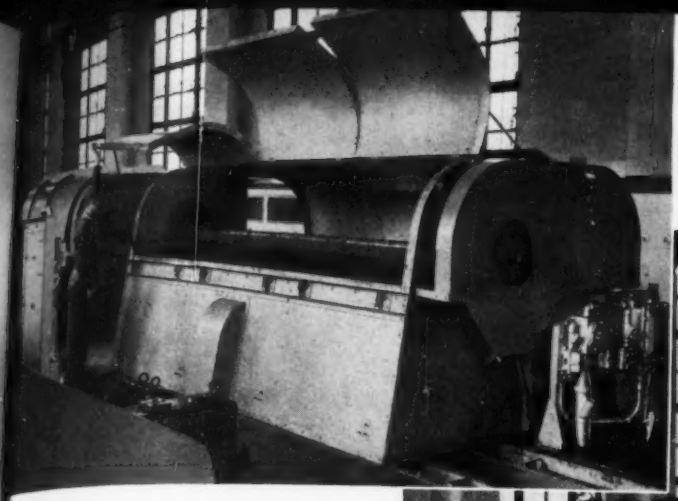
We are glad to be able to give Uncle Sam our best efforts. We are glad, too, that a portion of our production may be allotted to our friends in the water works field who have priority rating. In real necessity, a high priority rating is usually granted. But without it, regulations do not permit us to fill orders promptly.

To aid our customers, we will furnish them with interpretations of priority regulations and amendments sent us by the War Production Board. We will serve you in every possible way till Victory allows our usual complete fulfillment of your valued needs.

THE LUDLOW VALVE MANUFACTURING CO., INC.
TROY, NEW YORK

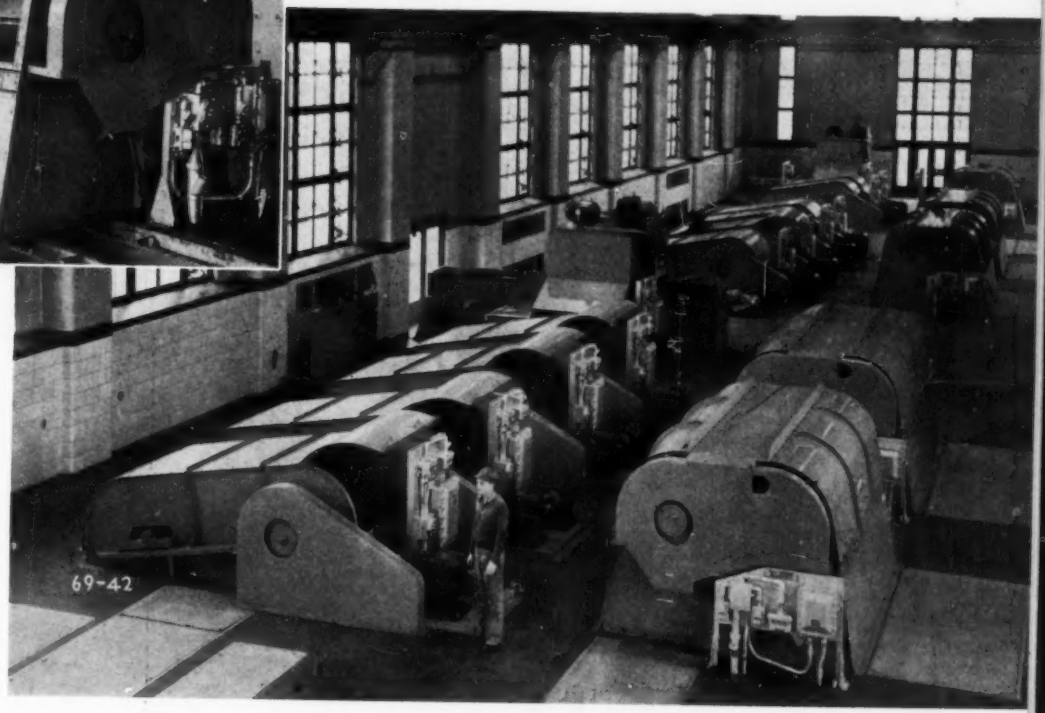
V-4

LUDLOW SINCE 1866 VALVES



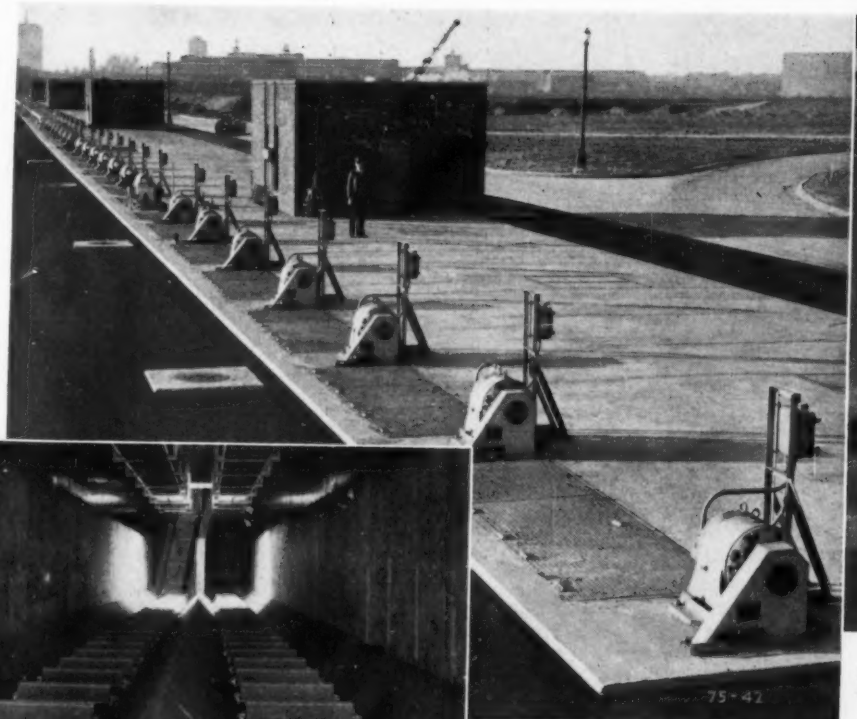
Large photo below shows the large operating room at the Detroit plant. The housing for the six bar screens and the twelve grit collectors may be seen. These units designed for maximum flow of 900 M. G. D. Left—a close-up view of screen with housing covers raised. Bars spaced ¾ inches —designed for flow of 180 M. G. D.

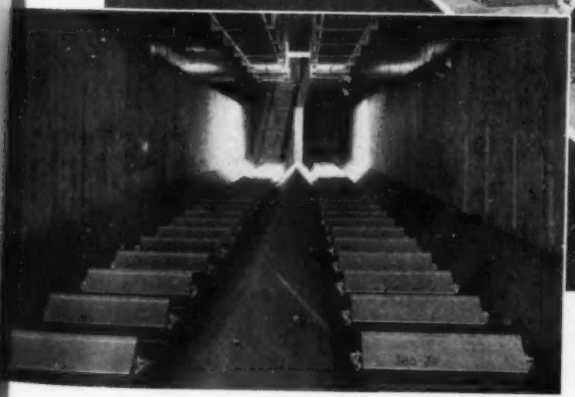
Completely equipped by Jeffrey, the Detroit sewage treatment plant is the most modern and up-to-date in the country today. Rectangular sedimentation tank design was adopted and Jeffrey primary collectors, bar screens, belt conveyors, screenings, grinders, scum removers and grit collectors are all doing a good job of it . . . as in other large plants.



IN DETROIT—ONE OF THE LARGEST

(Patented)





Above—view through one of the 270-foot main sludge collectors. Left above—showing 64 individual main and cross-collector drives. Seven main collectors (each 270' x 16' x 15') and one cross collector in each tank. Total settling capacity at 90 minutes detention—420 M. G. D. Left—view through one grit channel equipped with two V-bucket grit collectors—designed for flow of 180 M. G. D.

Our Sanitary Engineering Division is prepared to offer technical information on our line of proved equipment and plant design.

THE JEFFREY MANUFACTURING CO.

996-99 NORTH FOURTH STREET

COLUMBUS, OHIO

Baltimore Boston Chicago Cincinnati Denver Houston Milwaukee Philadelphia Scranton Salt Lake City
Birmingham Buffalo Cleveland Detroit Harlan Huntington New York Pittsburgh St. Louis

No trace of scale or corrosion after *14 MONTHS USE!*

A Graver Hot Process Water Softener installed in a Minnesota Municipal Water and Light Plant softens boiler feed water for 1 Riley and 3 Kidwell 250 H. P. water tube boilers. Operating at 400 lbs. pressure they generate 300,000 lbs. of steam in summer and 500,000 lbs. in winter. Hardness of 11 to 22 grains is reduced to .4 of a grain.

UP IN MINNESOTA, a Municipal Water and Light Plant* installed a Graver Hot Process Water Softener to treat their boiler feed-water. Their boilers supply steam to drive the turbines which generate power for the city lights and steam to heat the business district of the town. And they are the source of power for the pumps which supply the city water.

The exacting demands on this boiler plant are continuous. Nevertheless, a thorough examination of the boilers after 14 months of use revealed that there was *no trace of scale or corrosion in the system.*

Briefly, Here Are The Facts

- Water supply tests 11 grains hardness in Summer and 22 grains in Winter.
- Graver Hot Process Water Softener reduces this to approximately .4 of a grain the year around.
- There is no trace of scale or corrosion.
- Water treating costs materially reduced.

This is just another example of the efficiency and economy of the Graver Hot Process Water Softener, and it is typical of the service this equipment is delivering in hundreds of plants all over the country.

If you have a specific water conditioning problem, consult Graver. There's no obligation.

You'll Want This Bulletin

Our new bulletin, No. 314, gives complete details about Graver Hot Process Water Softeners and includes flow charts, tables, and other valuable data. Write for your copy today.

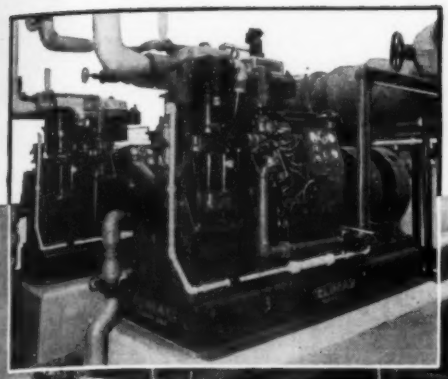
GRAVER TANK & MFG. CO., INC.

4809-43 Tod Avenue, East Chicago, Ind.

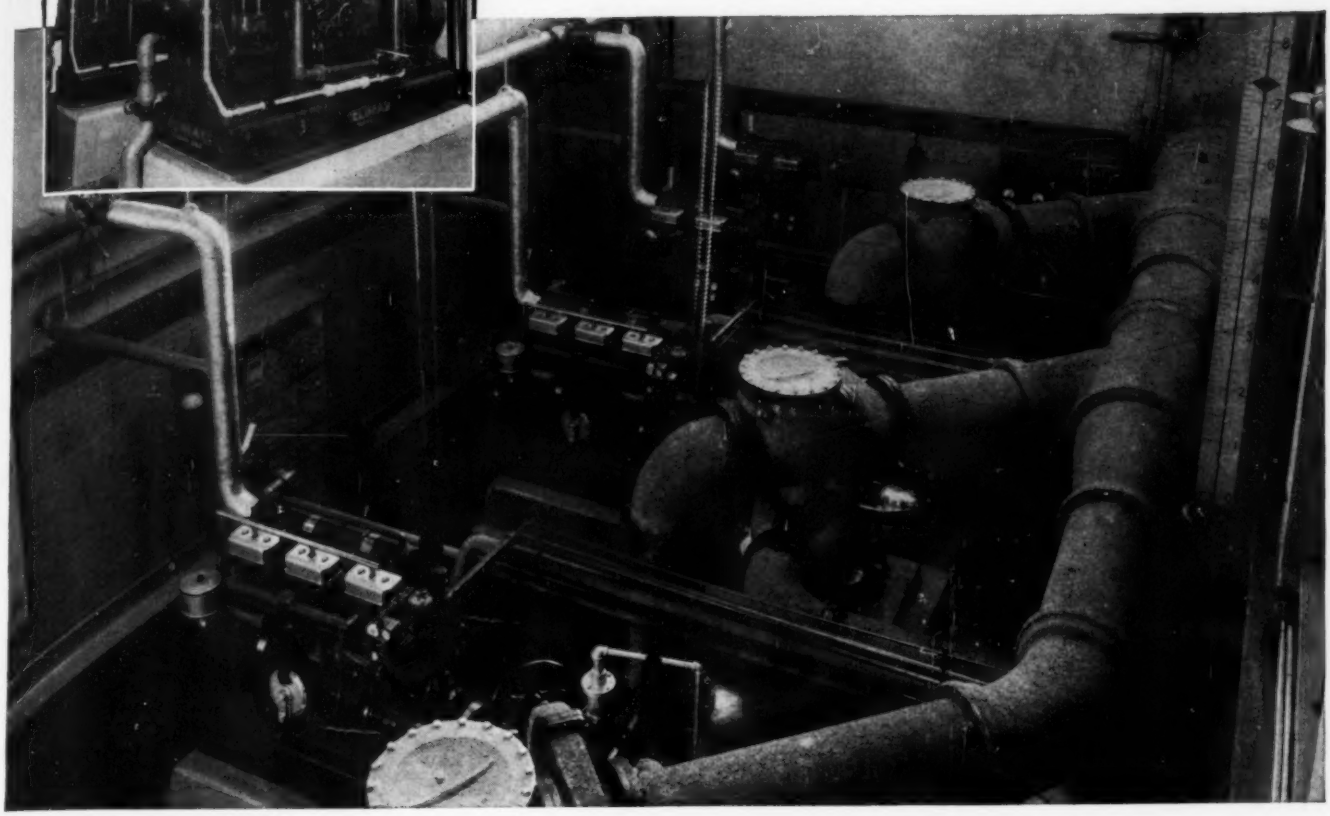
NEW YORK CATASAUQUA, PA. CHICAGO TULSA

**Name on request*

GRAVER HOT PROCESS WATER SOFTENERS



Another Climax RECORD Performance



Climax Engines and Generating Sets

The Climax Pump Engines and Generating Sets installed at Aurora, Ill. have just completed a record of money saving and highly satisfactory performance. Under the direction of Superintendent Walter A. Sperry the sets supply all power required and put the plant completely "on its own."

The installation consists of two Climax R61, 75 hp. Sewage Gas Engines driving eight M.G.D. pumps and two R41, 50 hp. Engines direct connected to Electric Machy. Mfg. Company 44 KVA, 30 KW, AC Generators.

By the addition of the Climax Generating Sets, the Aurora Sanitary District has proven that outside power is not necessary for either normal or emergency power. By total conversion to Climax Engines and Generating Sets Mr. Sperry has not only abolished outside power bills, but has earned substantial profits in doing so.

69 months of operation of the pump engines and 15 months of operation of the two Climax Generating Sets have earned Aurora a net profit of $25,135.85 on a total investment of $18,321.78. Engine performance has been dependable, maintenance cost has been low, and troublesome mechanical problems have been eliminated.

Additional details regarding this installation will be furnished by writing Climax Engineering Co., Department K, Clinton, Iowa.

Wherever low cost gas is available, Climax Engines will generate electric power at less cost and with greater dependability than by any other known method.

For continuous (24 hour) or intermittent service specify Climax Generating Sets.

They can reduce your operating costs, eliminate your power bills and put you "on your own" at a profit.

Made Aurora's Sewerage Plant Totally Independent of Purchased Power

and

Earned a Net Profit of

$25,135.85

on a Total Investment of

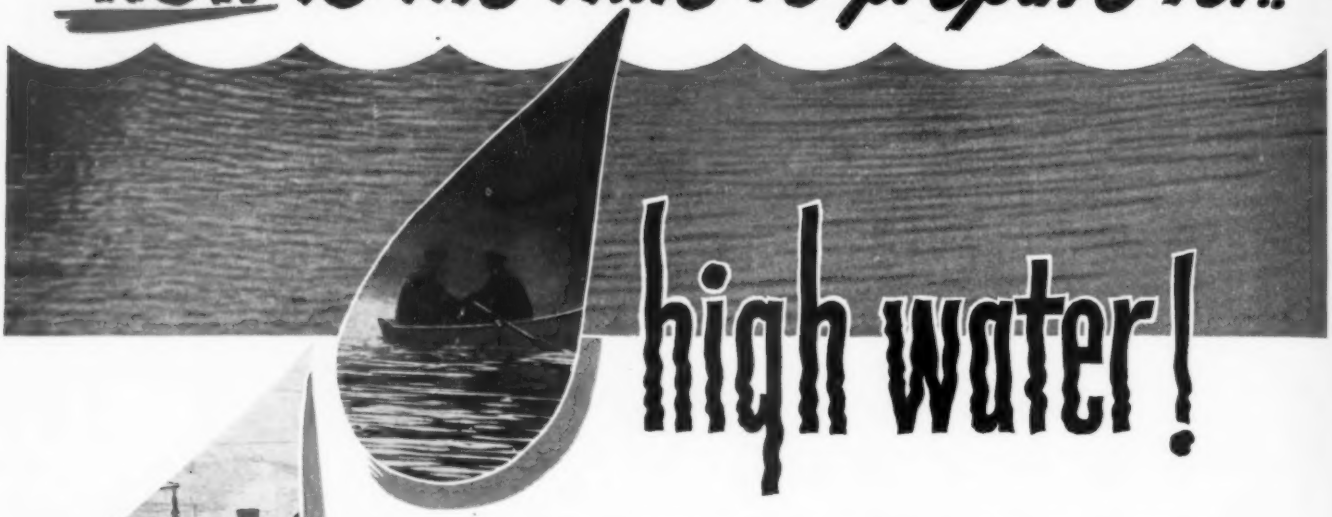
$18,321.78

in 15 Months' Operation

Climax Engineering Company

General Offices and Factory: CLINTON, IOWA · *Regional Office:* DALLAS, TEXAS

NOW is the time to prepare for..



high water!

The increased turbidity and maximum water density that exists during and after flood-time, calls for Standard Silicate. Reactions are speeded, and a larger, denser floc produced by this treatment. Thus longer filter runs are possible and an appreciable saving of chemicals is effected.

Our Technical Staff will gladly tell you about the results being achieved by others through the use of Standard Silicate of Soda.

If you are interested in improving *your* cold-water operation, fill in and mail the coupon.

ALKALI

Standard Silicate Division, Diamond Alkali Company,
Oliver Building, Pittsburgh, Pa.

Our water supply has the following characteristics:

..... Million Gallons per Day Average Turbidity.. .....

Present Dosage ..... gr./gal. Coagulant .....

We would be glad to receive further information on the use of Standard Silicate.

Name.....*Title*.....

Water ks.....*City*.....*State*.....

DIAMOND ALKALI COMPANY • Standard Silicate Division

Plants at CINCINNATI · JERSEY CITY
LOCKPORT, N. Y. · MARSEILLES, ILL.
DALLAS, TEXAS

General Offices • PITTSBURGH, PA.

Onward to War
MARCH AMERICA'S
POWER SOLDIERS
Miracle peacetime construction of high-tension steel transmission lines now helps to carry War Loads—to crush War Lords.
For many years Ziebarth Construction specialized in this field. The Ziebarth name has been identified with some of America's greatest achievements in hydroelectric power: Boulder Dam, Grand Coulee, Bonneville, Fort Peck Dam.
Working under pressure of time over extremely hazardous terrain, the 1,700 men comprising the Ziebarth organization acquired skills that came into demand for all types of heavy-construction work. Today, at various points in the United States, Ziebarth has under construction nearly a dozen big jobs. In addition to the current gigantic Basic Magnesium electrical installation, this work includes other high-tension transmission lines, electrical sub-stations, airport lighting, personnel shelters, railroad signal installations, telegraph lines, sewage plants, water supply, pumping plants.
If you need proven "Get the job done—fast", heavy-contracting work, contact...
ZIEBARTH
CONSTRUCTION
Fritz Ziebarth—806-8 West Esther Street, Long Beach, California
Vancouver, Washington; Reno, Nevada
THE STORY OF Ziebarth CONSTRUCTION
Write Today!
Want to know how this fast-moving, versatile crew of contracting experts grew into one of America's leading constructions firms... and how they can help you? Then write for "The Story of Ziebarth Construction." It will come to you gratis and with no obligation.

WHAT'S THE MATTER WITH THE HEATER?

HOUSEWIFE: "Why do water heater coils clog up so fast? Can't something be done about the water?"

PLUMBER: "I don't know, lady, I've been fixing water heaters for 25 years, and they all scale up."

THE ANSWER: Yes, something can be done about the water. A simple treatment with Calgon will stop scale formation in water heaters.

THE war has already caused an acute scarcity of metals for heater coils. Soon your customers may find them impossible to get. You can solve this problem economically for the whole community and gain the good will of your customers.

The small amount of Calgon needed to accomplish this result is well within the budget of city water departments. No increase in water rates has been necessary in the hundreds of cities where Calgon is being used.

Calgon* is not a new and untried product, but has been thoroughly proved in hundreds of different cities having widely varying types of water. It not only prevents scale in water heaters but, used after lime-soda softening, Calgon prevents after-precipitation and cementation of filter sands. Mains are kept open so that they will deliver their full capacity.

Samples and complete instructions for tests will be sent on request.

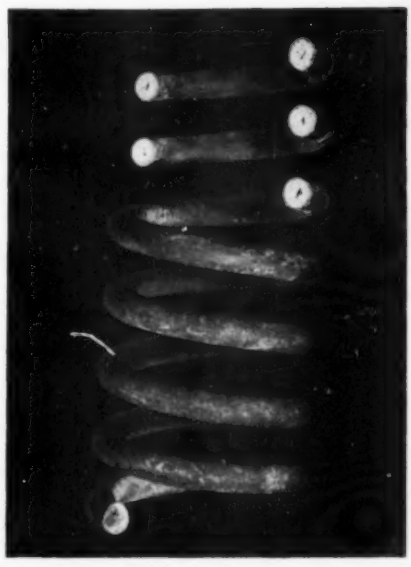
Calgon solves 4 water works problems

1. **Prevention of scale** from hard, high-bicarbonate waters. Calgon, added at the plant, prevents scale formation in mains, meters and hot-water heaters, throughout the system.

2. **Corrosion control** — Calgon forms a thin protective film on metals and metal oxides at pH values of 5.0 and higher. This reduces the attack of oxygen to such an extent that corrosion ceases to be a problem.

3. **Prevention of "red water"** — Calgon prevents the precipitation of dissolved iron. Thus "red water," either from iron initially present in well water, or from corrosion, can be eliminated.

4. **Stabilization of water** following lime or lime-soda softening. Calgon's ability to prevent precipitation of calcium carbonate stabilizes water to the ends of the system.



SCALED UP HEATER COILS *and calcium carbonate deposits in pipe lines can be made a thing of the past by a treatment of 0.5 to 2 ppm. Calgon. The cost of this treatment is extremely low.*

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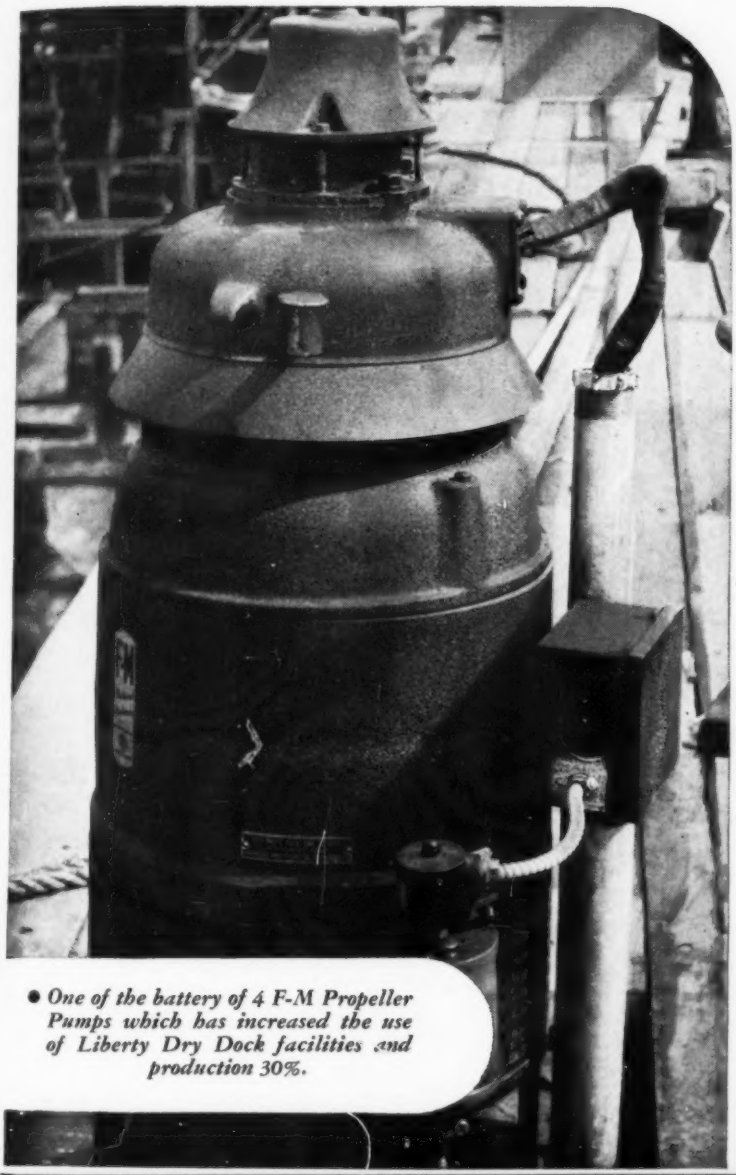

• *One of the battery of 4 F-M Propeller Pumps which has increased the use of Liberty Dry Dock facilities and production 30%.*

That 4 new pumps, or any other unit of a construction program as complicated as shipbuilding, could increase a shipyard's production as much as 30 per cent seems almost incredible. But that is what happened at the Liberty Dry Docks.

With the inauguration of the high-speed shipbuilding program brought about by the war, the Liberty Dry Docks replaced certain steam pumping equipment with four 12-inch Fairbanks-Morse Propeller Pumps with stainless steel shafts and bronze propellers. Each pump is driven by a 20-hp. F-M hollow shaft slip ring motor.

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Equipment to increase speed of production is available on priority. Use your priority to get Fairbanks-Morse pumping equipment—no slowdown, no breakdown, no stoppage. *Buy for today—with an eye for tomorrow!* Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago. Branches with service stations throughout the United States and Canada.

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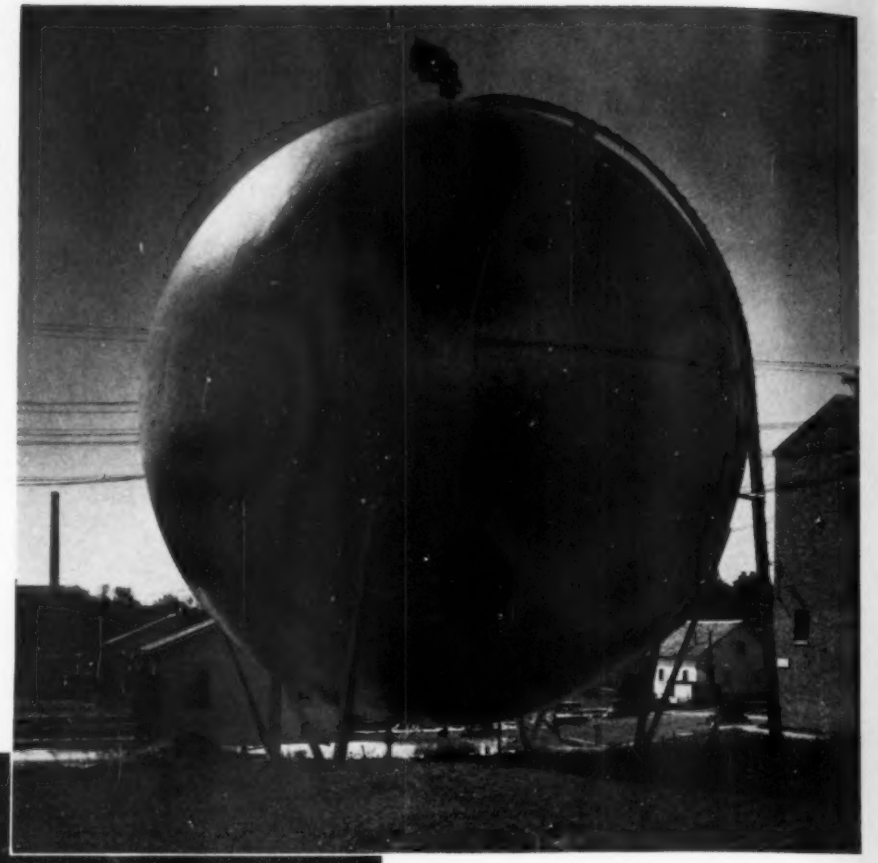
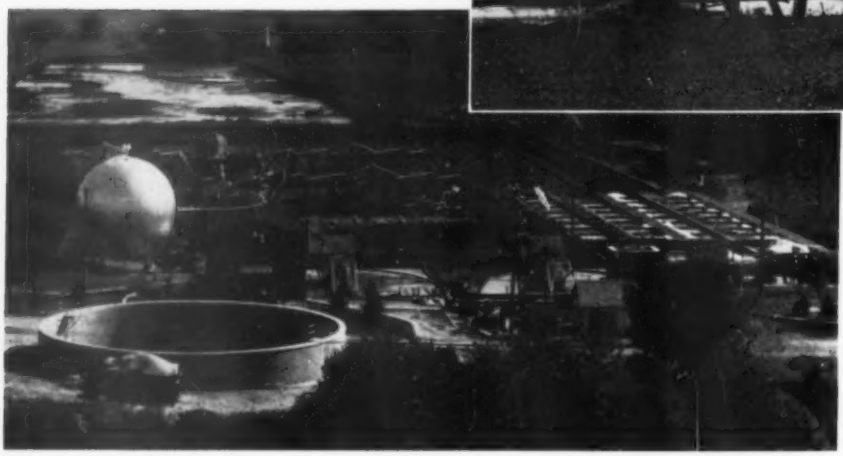
Pumps

HORTONSPHERE Helps Sewage Plant PAY FOR ITS OPERATION





ABOVE: 36-ft. diam. Hortonsphere for storing 50,000 cu. ft. of sewage gas at Sioux Falls, S. D. Operates at 30 lbs. per sq. in pressure.

LEFT: General view of the Sioux Falls plant.

WHEN the sewage disposal plant at Sioux Falls, S. D., was rehabilitated several years ago equipment was installed to utilize gas from the digesters for heating purposes and for fuel in engines driving blowers and a generator.

The 36-ft. diam. Hortonsphere illustrated above was installed to balance the difference between gas production and usage. When the digesters produce more gas than is used the surplus is pumped into this high pressure holder. When the situation is reversed, and the digesters do not furnish enough gas, the supply in the Hortonsphere flows to the burners and the engines.

By utilizing the gas instead of wasting it, the Sioux Falls plant is able to show appreciable savings. Savings in dollars and cents that will amortize the cost of the equipment in six years. After that the savings can be applied against the operating cost of the plant.

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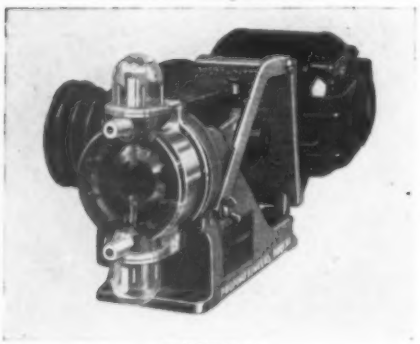

FIGURE 1

FIGURE 2

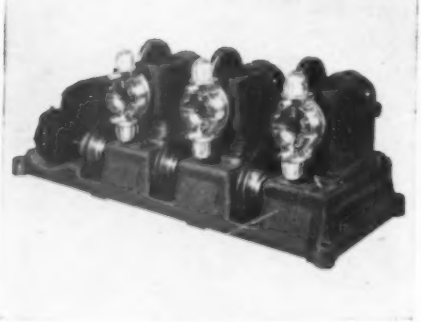

FIGURE 3

Fig. 1—Heavy Duty Midget Chlor-O-Feeder

Fig. 2—Duplex Multi-control Feeder

Fig. 3—Triplex Multi-control Feeder

Fig. 4—High Pressure Midget Chem-O-Feeder

Fig. 5—Low Pressure Chem-O-Feeder

Fig. 6—High Pressure Chem-O-Feeder

Fig. 7—Belt Shifter Heavy Duty Midget Chlor-O-Feeder

FIGURE 4

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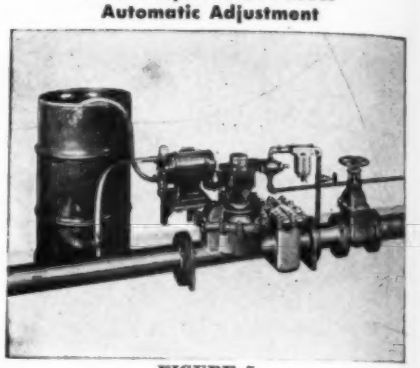

FIGURE 5

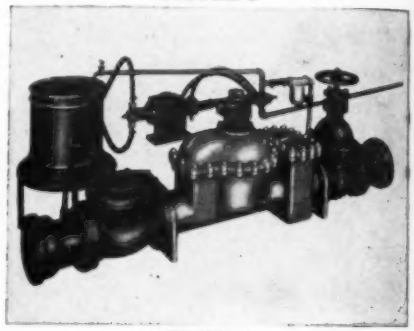

FIGURE 6

FIGURE 7

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Is a recital of experience with mild chlorination of returned sludge, during a number of summers, for the purpose of controlling sludge bulking. The author is—

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"Dependability of Double Check Valve Installations"

In response to a number of requests in recent months asking for advice as to the relative merits and dependability of approved Factory Mutual type double check valve installations between public and private fire protection systems, the forthcoming article has been prepared at our request. It gives the record of double check valve installations, as determined by systematic inspections and tests, of this equipment at many points in Connecticut and represents the best record available of the extent to which approved double checks constitute dependable protection to public water supply against private fire service back flow into the mains. The author is—

F. O. A. ALMQUIST, Senior Eng'r,
State Dept. of Health, Hartford, Conn.

"Biological Water Conditioning"

Is the interesting story of hardness precipitation by the plant Chara, which also performs another useful service in inhibiting algae growths. The report comes from—

HENRY C. MYERS, Chemist,
California Water and Tel. Co., Palm City, Calif.

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Chicago Office, L. H. Lingnor, Rep., 330 S. Wells Street. Cleveland Office, B. C. Brumm, Mgr., 2025 Lakeland Avenue, Lakewood, Ohio. New York Office, J. M. Angell, Jr., Mgr., 155 East 44th Street. Los Angeles Office, Don Harway, Rep., 816 W. Fifth Street.

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WATER WORKS & SEWERAGE

VOL. 90, No. 2 *A Gillette Publication* FEBRUARY, 1943

DEVELOPMENTS IN SEWERAGE AND SEWAGE TREATMENT

A Review of Progress and Change During 1942

By

CHARLES GILMAN HYDE
Professor of Sanitary Engineering
UNIVERSITY OF CALIFORNIA
BERKELEY

and

A. M. RAWN*
Chief Engr. and General Manager
SANITATION DISTRICTS OF
LOS ANGELES COUNTY

C. G. Hyde

A. M. Rawn

THIS is a time when the interests and efforts of the American people are, or should be, solely directed to the war effort. It is essential that all who are concerned with sanitation, including the essential provision of adequate sewerage and the proper treatment and disposal of sewage, should devote their efforts to the end that failure shall not occur and that, despite the halting effect of priorities and the increased burdens due to loss of manpower, sewerage works shall meet the imperative demands of the current situation.

It is the purpose of this review to discuss the effects of the war upon the general field of sewage and sewage treatment and disposal and, as well, to picture the progress and developments in the field aside from the war influence.

Effect of the War and Defense Efforts

In general the conduct of the war has stopped sewerage and sewage treatment undertakings except as these have been concerned with military and naval posts, or have been made necessary by new concentrations of population incident upon the war effort. Many new posts and industrial plants have been constructed and for these all necessary utilities, including sewers and, in many cases, sewage treatment and disposal, have had to be provided. New and improved works for older existing posts and industrial plants have also been required. It is difficult to state the number of such undertakings. There are probably many hundred. Some of these have required sewers only, connection being made with the sewerage systems of adjacent communities, but the major number has required completely independent sewage treatment and disposal. As of August 31, 1942, F.W.A. had allotted $43,000,000—authorized under the Lanham Act—for building or extending 220 sewerage systems. Of these more than 130 are completed or under construction.

Effect on Sewer Construction

The construction of new sewerage systems and the extension of existing sewers have been curtailed during the past year because of priorities and lack of manpower, except under the conditions just recited. The scarcity of materials and more insistent demands of other sorts have in numerous cases made it difficult to meet the requirements of the works directly necessary to the war effort. This statement applies particularly to operative equipment; motors, pumps and the like. A perhaps not altogether unsalutary effect has been to make responsible authorities "materials-conscious" with resulting conservation of critical materials and the searching out and utilization of available non-critical materials.

Effect on Character and Volume of Sewage

The war activities have produced extraordinary migrations of workers and Army-Navy-Marine Corps personnel. Thus congestion in industrial workers has been brought about over-night and new posts have had to be created with a speed such as the country has never before witnessed. This concentration of people has produced greatly increased volumes of sewage, demanding enlarged conduit sizes and new or enlarged treatment works. Sewage of military posts is high in the per capita contribution of suspended solids, bio-chemical oxygen demand, grease, and in most instances, grit.

Effect on Character and Volume of Industrial Wastes

The war has developed a metal and munitions industry without precedent. Many of the wastes from these industries are corrosive to sewers and toxic to biological methods of sewage treatment. These facts have had to be recognized in the operation of existing sewerage and sewage treatment

Footnote — *Associate Editor, "Water Works and Sewerage".

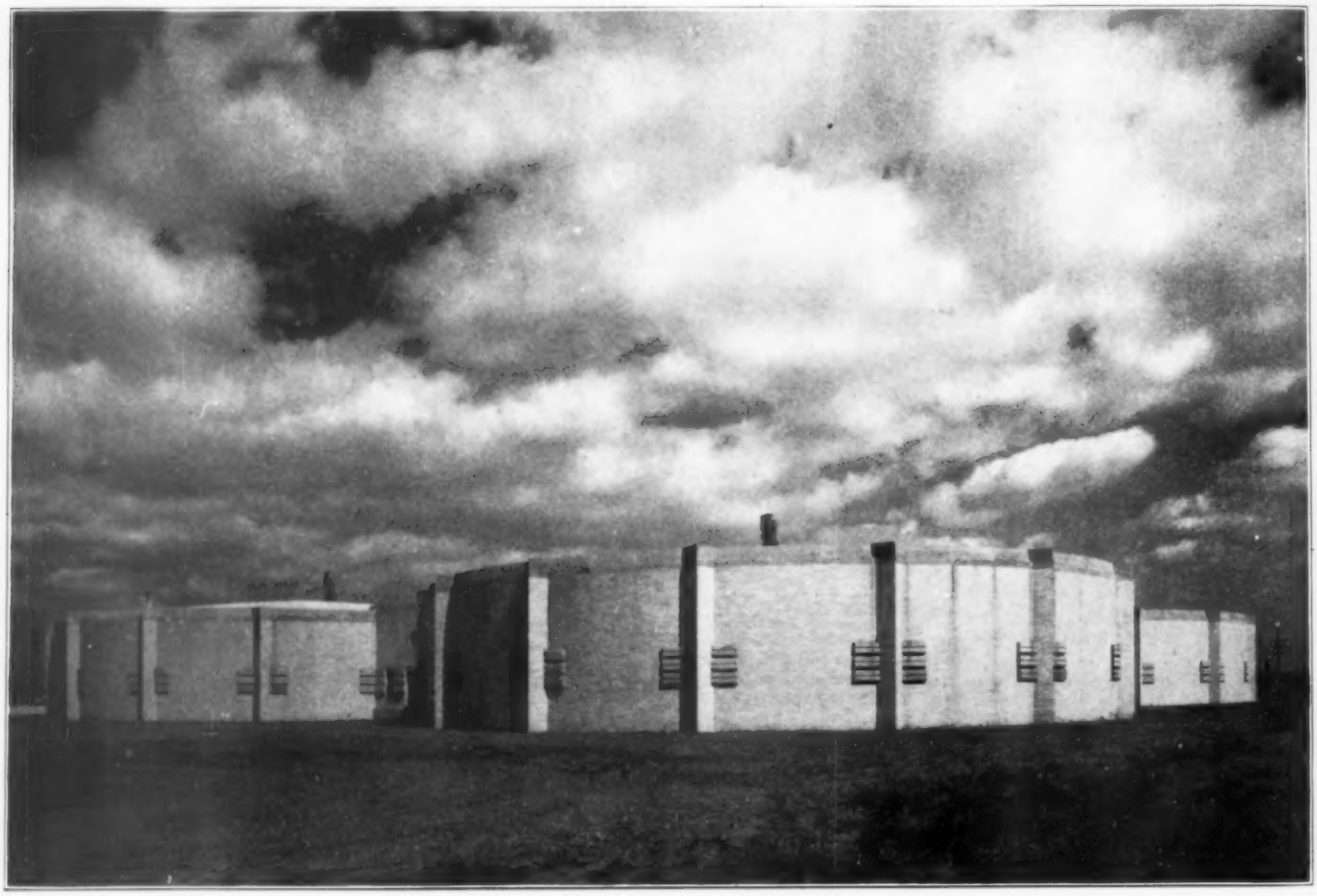
facilities and in the provision of new ones.

Effect on Sewage Treatment

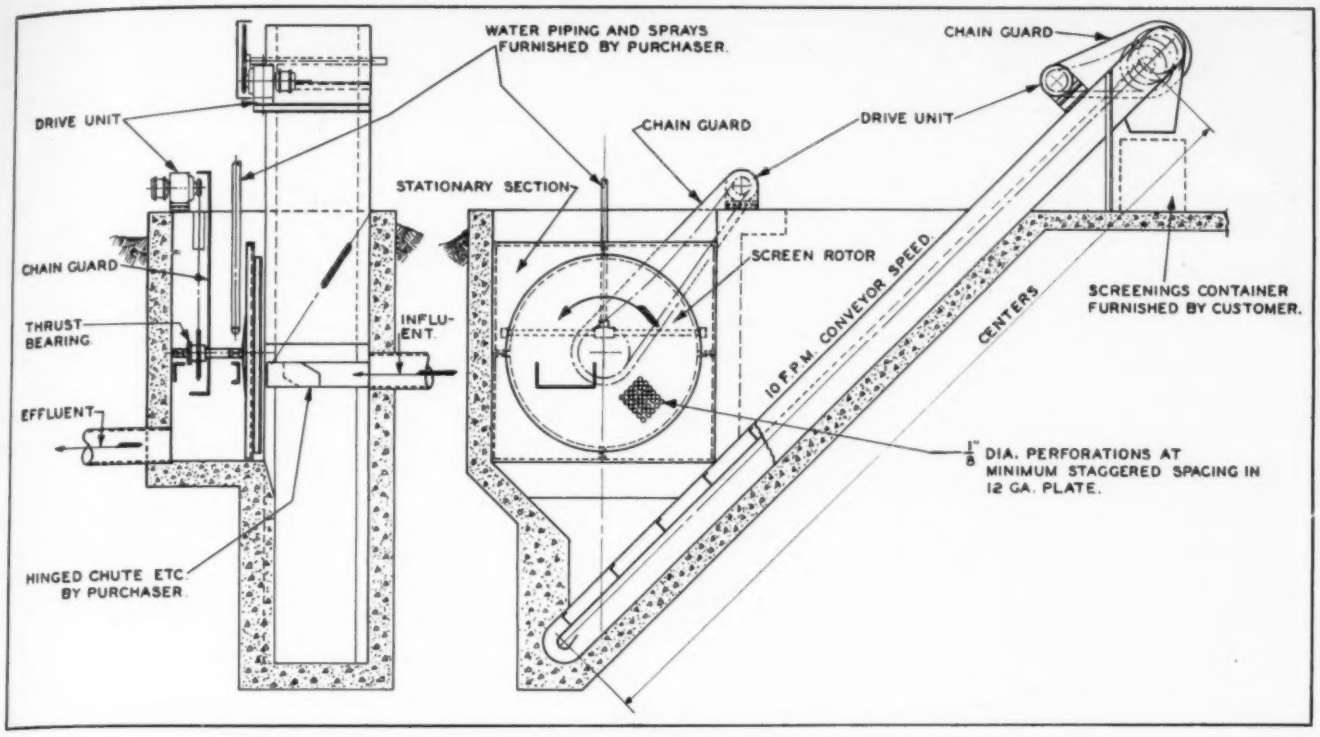
The great number of new posts has required the construction of many independent sewerage systems with appurtenant sewage treatment works. Where it has been possible to connect with existing works in the smaller places, many have become overloaded or else have required to be enlarged or possibly materially altered in character as well as capacity. Pretreatment has been necessary in the case of certain industrial wastes. Military post treatment plants have universally required grit and grease removal as preparatory to further treatment. Attempts have been made to capitalize natural conditions to permit of the use of simple or less efficient methods of treatment. Perhaps these efforts have not been as consistently made as they should have been in some cases. In many of the states of the Union, health authorities have recognized the temporary nature of Army posts and cantonments and have allowed latitude in the design of sewerage works. In others, unfortunately, advantage has been taken of the disposition of the military authorities to comply with State requirements, valid or otherwise, to build overly expensive and at times unnecessarily complete treatment works, with the result that excessive expenditures for sewerage have been incurred in the provision of facilities for many cantonments and posts. One obvious effect has been the relatively sudden appearance of great numbers of new treatment plants solely concerned with the war effort, whose tenure of life cannot be known for the present but, in most instances, is presumed to be quite temporary.

Effect on Technical Literature

It is of interest to inquire what the effect of the war has been upon the technical literature of sewerage and sewage treatment and disposal. Considering the fact that this is a so-called "total war," it might be presumed that the technical literature would partake of this quality and be largely, if not wholly, concerned with the war effort. This has not been the case, nor is it the case for England and the British Empire, as evidenced by technical articles appearing in the London "Surveyor" devoted in a large part to sewerage. Why? is a question. Of 232 titles cited in the critical review of the literature of 1941 by the Committee of the Federation of Sewage Works Associations, none were concerned with war or defense matters. Of 358 titles of publications cited in Public Health Engineering Abstracts of the U. S. Public Health Service during the twelve months, November, 1941, to October, 1942, only two were concerned immediately with these matters, omitting articles and discussions of Military post treatment plant design not substantially different from those for typical American communities. Of 200 articles and papers, including reviews and abstracts, appearing in Sewage Works Journal during the year 1942, 20—or 10 per cent dealt primarily with war and defense problems. In this magazine—"Water Works and Sewerage"—seventeen, or 17 per cent, of the titled articles published in 1942 had reference more or less directly to war and defense measures and problems. This finding leaves out of calculation a large number of reports on water and sewage works conventions and meetings whereat a considerable de-



Digesters of the New Treatment Plant of Hammond, Ind.
With a capacity of 40 mgd., believed to be the largest plant recently built.



An Innovation—Moor Type Revolving Disc Screen with Dewatering Type Scraper

A new Jeffrey screen and dewatering conveyor, designed especially for industrial waste screening. The screen proper is a perforated rotating disc, cleaned by jets on discharge side of screen plate. From drop-pit screenings are lifted and dewatered in inclined scraper conveyor.

gree of attention was paid to war effects and their prevention or remedy. Despite the fact of the war, the volume and character of the technical literature dealing with sewerage and sewage treatment and disposal matters has remained much the same as previously with the exceptions noted.

Construction and Maintenance of Sewers

The effect of the war on the volume and character of sewerage construction has been stated. Post-war conditions will doubtless demand a catching up with sewerage requirements in terms of extensions and delayed maintenance work. Lack of manpower and materials is unquestionably reducing the amount of repair work which is being performed. On the other hand, maintenance in the form of protection against excessive corrosion, minor repairs and cleanup is being conducted with especial care in view of the fact that existing works must be made to serve throughout the duration of the war and afterwards until men, money and materials shall again become available.

Character and Composition of Sewage

Aside from the effects due to the war in congested localities, the character and composition of municipal sewage, as such, is apparently remaining static. The volumetric use of public water supplies and the proportion reaching the sewers, expressed in per capita terms, has not changed appreciably. Perhaps greater attention is now being paid to infiltration than formerly in view of its effects upon sewage treatment, not to mention that upon the carrying capacity of the sewers.

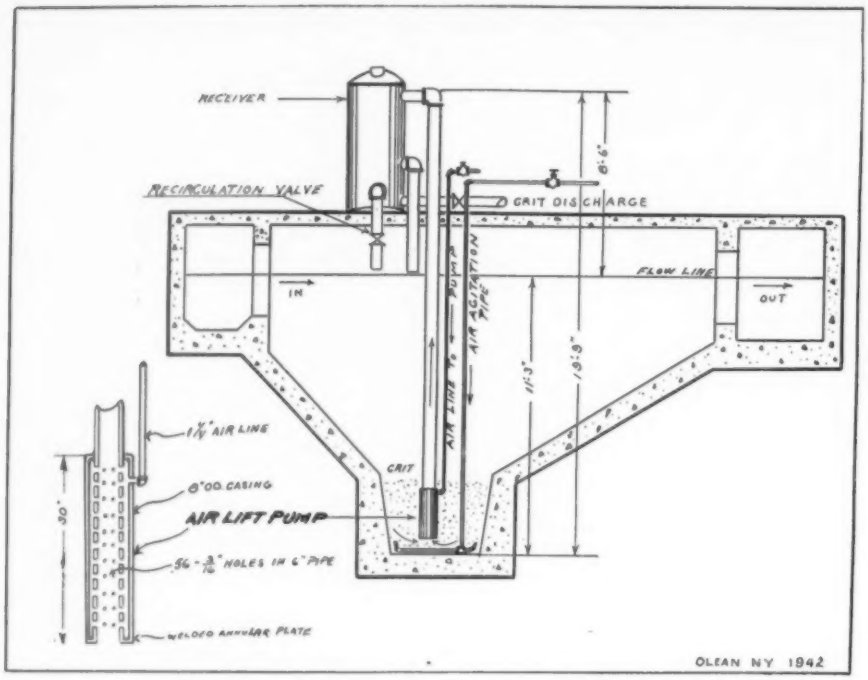
It has been stated that a large number of household garbage grinders have been installed in recent years in the United States. The lack of critical materials has effectively stopped the production of such equipment for the duration of the war. There is no note of increase in the number of communities which have adopted a program of disposing in the sewers of the collected garbage after grinding.

Character and Composition of Industrial Wastes

As already indicated, the effect of the war has been to produce increased volumes of industrial wastes at many new and old locations. Some of these wastes have suddenly become of significance because of their character or volume, or both. The effect upon sewage treatment and river pollution has been marked.

The whole industrial wastes problem, quite irrespective of the war effort, has gradually been receiving more and more attention, and rightfully so, at home and abroad. Valuable research on treatment methods is being considered on a crescendo scale. Excellent progress is being made. Much remains to be accomplished, perhaps particularly in implementing what is already known. The importance of this matter is being reflected in the growing volume and worth of the literature on the subject, both domestic and foreign.

In Great Britain the matter of pre-treatment of trade wastes, first coming to America early in the century, has been greatly emphasized by the passing of the Public Health Act of 1937 (Drainage of Trade Premises). Prior to the passage of this Act municipalities were required by law to furnish treatment of ordinary sewage and storm runoff, and to receive and treat wastes from industries only if the sewers and treatment works were adequate. The 1937 Act makes it obligatory that municipalities receive and treat all "naturally contributory" trade wastes. Since large sections of England, especially the Midlands, are heavily industrialized, it is obvious that under the new regulations the sewage treatment problem in England will be greatly complicated. Authorities are agreed that the solution can only be effected by mutual cooperation of "traders," so-called,



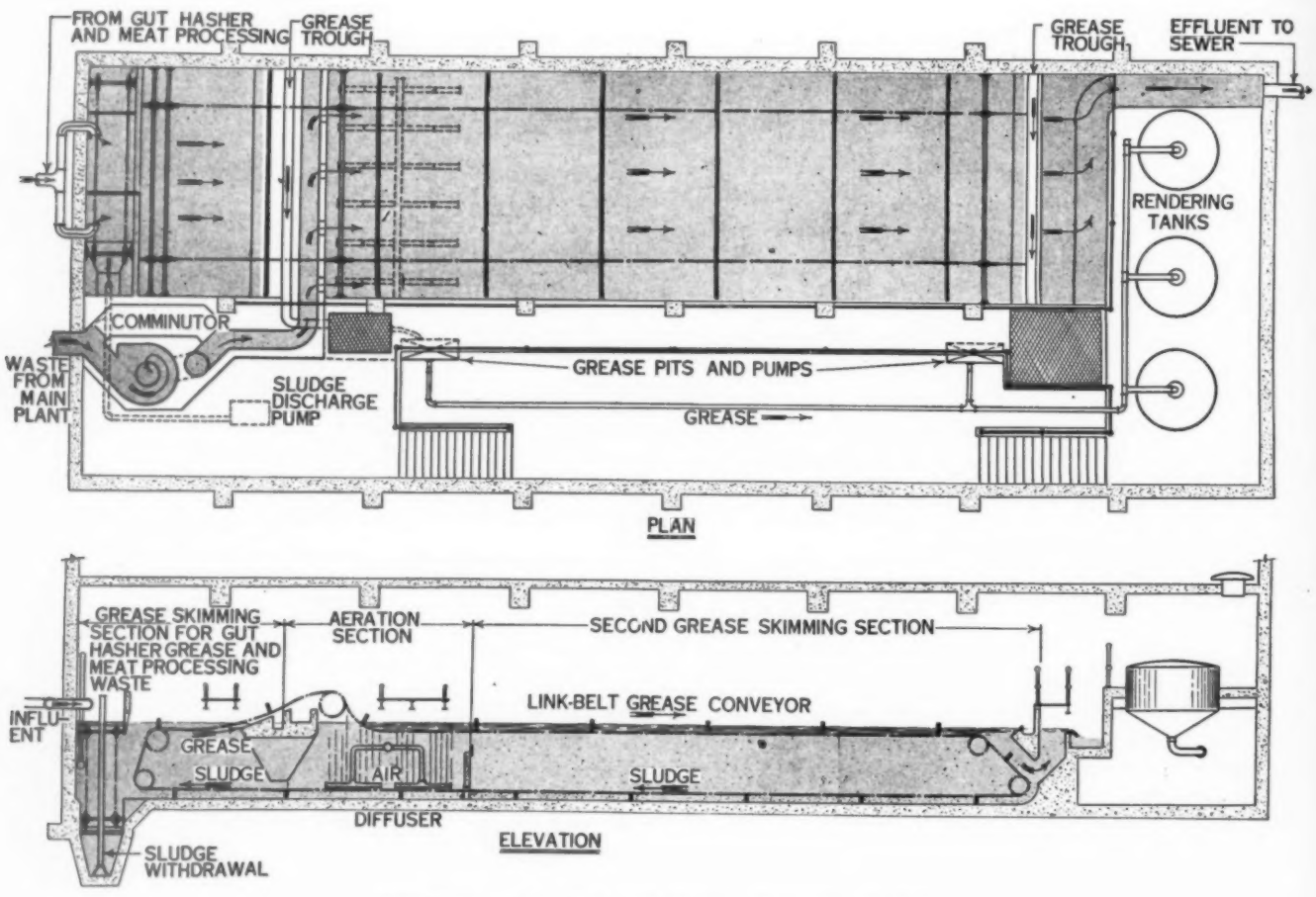
Novel and Effective Pneumatic Grit Washer and Ejector

Designed by Nelson M. Fuller, Supt. of Water Works and Sewerage, and associates, at Olean, N. Y., this air-lift grit washing unit and ejector was home built and installed in the existing grit chamber of the Olean plant. Fully described in the October, 1942, issue of this magazine.

and public agents and that the law can be enforced only gradually and perhaps to no great extent during the progress of the war. Meanwhile the burdens placed upon receiving waters will doubtless be increased, perhaps in some cases beyond tolerable limits.

Sewage and Sewage Treatment Research

In the aggregate a truly vast program of research is being conducted with respect to the character and composition of sewage and industrial wastes, consequent treatment, plant loadings, and methods of treatment, preparatory and final. Basic research is being conducted in research laboratories, as such, in educational institutions, in Federal and state laboratories; and, to an extent now slowed down by the war, in the laboratories of the larger sewage treatment plants. Vital data and information are being secured by plant scale experiments at a number of treatment works. Such studies are generally conducted when special problems arise which demand solution. Pilot plants are being constructed and their performances



Combination Clarifier and Grease Recovery System

Installed by Link-Belt Co. for the Tobin Packing Co. at Ft. Dodge, Ia., and reported to be doing an effective job. A common unit provides pre-settling and aeration, followed by floatation, grease skimming and secondary settling. Chlorine applied in conjunction with air diffusion effectively increases yields of marketable grease—see graph.

speeded at necessary sewage treatment works and in several research laboratories.

Research in Laboratory Techniques

Laboratory techniques with respect to several important chemical determinations, as well as the isolation and demonstration of the presence of certain bacterial groups and individuals, remain as they should, in a state of flux. The so-called "Standard Methods" are, or should be, considered in some cases as temporary. However, they should be employed by all workers generally, unless or until further research determines improvements. At the present time important researches are being conducted with reference to the determination of grease in sewage, to procedures in measuring bio-chemical oxygen demand, and to the presence of coliform and other specific organisms, together with bacteriophage, enzymes and vitamines (riboflavin, for example). Important results are being achieved. Laboratory workers and plant operators in the United States may well feel proud of their contributions to this and many other fields related to sewerage, sewage treatment and disposal.

Laboratory Control of Sewage Treatment Works

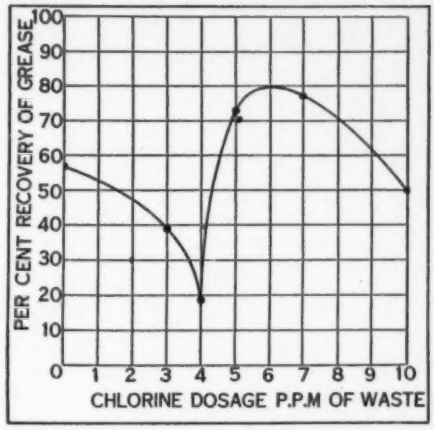
Many of the larger sewage treatment plants of the country are provided with well equipped and competently manned laboratories which exercise an important influence upon operations or at any rate demonstrate within the means at command the plant loading and plant performance. For many years rule-of-thumb and cut-and-try methods of operation were the general order of the day. The idea that some measure of laboratory control and some degree of knowledge concerning the amount and character of the sewage treated and the character and effect of the effluent of even the smaller plants is of comparatively recent origin, and assuredly of still more recent practice. Although long strides forward to this end have been taken, much remains to be accomplished. With more complete and complicated treatment processes, and with operating personnel of higher caliber, a great deal may be expected in this direction in the relatively near future. Sewage treatment and disposal do not constitute today quite the haphazard undertaking that they represented in the recent past and the outlook for greatly improved conditions in the not-to-distant future is encouraging.

The Problem of Stream Pollution

The matter of stream pollution, and especially the effect of war industries thereon, has been referred to. In the public mind stream pollution is gradually beginning to assume some degree of importance. The value of streams for water supply purposes has long been recognized, but a certain fatalistic attitude seems to have prevailed with respect to the maintenance of esthetic values in streams and water ways not directly so utilized. The protection of shell-fish layings in salt waters long ago forced a certain degree of recognition of the problem in isolated instances.

There is a trend, thanks to the work of the U. S. Public Health Service and, more recently, also, of the National Resources Board, toward the consideration of the problem of pollution as related to entire river systems. As for local streams and water ways, the *laissez faire* attitude of the past is giving way to more active demands for waters which are esthetically decent and which can be utilized for recreational purposes or, at any rate, are not repulsive to sight and smell.

The economic phases of this matter cannot be overlooked. It is entirely rational and pertinent to inquire what the cost of stream cleansing will be and whether the overall results will be commensurate with the cost. A nation which spends vast sums on personal cleanliness and appearance, and on decent and attractive living conditions, may well afford to spend considerable sums of money to preserve or redeem a more distant and less immediate environment.

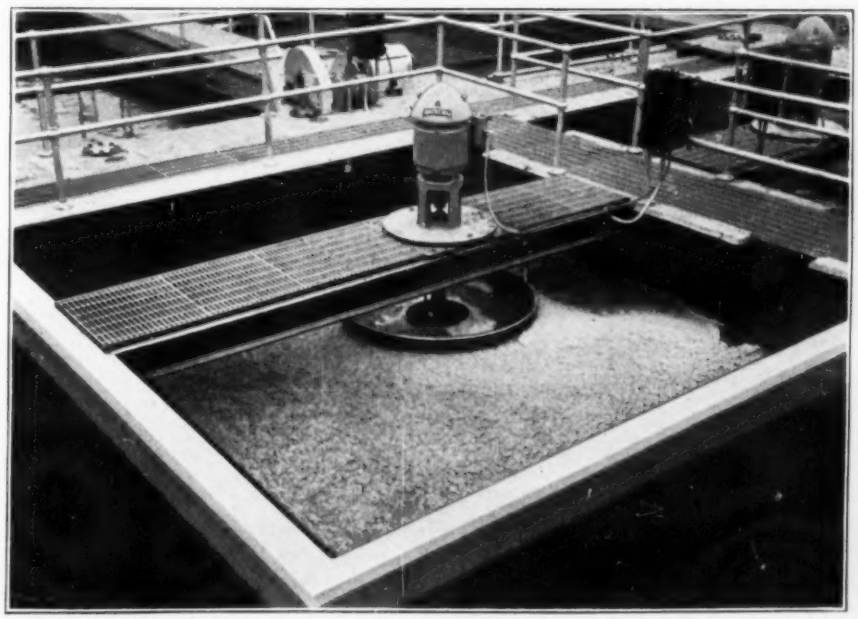


Charted Effects of "Aero-Chlorination" on Recovery of Grease from Packinghouse Wastes

In this instance it is interesting to observe that there is something of a "break-point" exhibited and an optimum chlorine dosage of 5 to 8 ppm. indicated to effect a maximum grease recovery of 80% with the chlorine-air combination and 57% with air alone. These published results were secured in the Tobin Packing Co. recovery unit (here illustrated) at Fort Dodge, Ia.

Screening and Comminution or Grinding

Screens or racks are employed today for the primary purpose of protecting pumps and other equipment rather than with the idea of recov-



"American" Grease Floatation Unit

Involves down-draft air emulsification followed by rising bubbles which produce a grease-foam blanket. The Cranston, R. I., plant, pictured on the following page, has such a unit.

The Compact 5.5 MGD Activated Sludge Plant of Cranston, R. I.

One of the newest and most complete activated sludge plants to be built. Provides grease separation by the aero-chlorination process, sludge elutriation, vacuum dewatering and incineration. This complete plant cost only a little more than $13.00 *per capita.*

ering from the sewage any significant weight or volume of pollutional material. It is true that screening may serve effectively in removing visible floating material where disposal by dilution represents the sole means of treatment; but, where equipment protection is sought, there is rationality to the proposition of comminuting or grinding the solids amenable to such handling and of returning this material to the sewage to be removed by sedimentation and other processes.

Because of this latter concept, the provision of screens and grinders has become common at many sewage treatment plants, both large and small.

If, however, there are means of destroying screenings, as by incineration, in equipment installed for the destruction of sludge, then the question of grinding and returning the screenings to the sewage flow may become one requiring special consideration. The oft-repeated adage that "circumstances alter cases" may well be invoked in connection with this general matter as with many another in the field of sewage treatment and disposal.

Speaking statistically, within the past decade literally hundreds of installations have been made of solids comminutors and screening grinders in American sewage treatment plants, and the practice is becoming accepted as standard.

Grit Removal

Until mechanically cleaned grit removal devices came into existence some sixteen years ago, the design and operation of grit chambers cre-

Novel Design of Final Settling Tanks

Of radical departure from final tank design for activated sludge, these units in New York's Bowery Bay plant have given results meeting the expectations of designer Richard Gould, Chief Engr., Dept. of Public Works. Note the inlet directed to the BOTTOM *of the tank of long narrow design. Note sludge travel and withdrawal at the* EFFLUENT *end. A surface back-flow toward inlet end is intercepted by "H" weirs serving* 40% *of the tank area out from the effluent end. (Performance of these unique tanks will be revealed in a near future issue of this magazine.—Ed.)*

ated the proverbial headache. But grit removal of some sort is imperative in the treatment of combined sewage, and is "indicated," as the doctors say, for some separate sewages to which large amounts or grit gain access by some means or another. Military camp sewage, despite the fact of separate systems of sewers, frequently contains amounts of grit which would ordinarily be considered excessive. The provision of extensive paving of roads in present-day posts probably does reduce measurably the amount of grit which would otherwise require to be handled.

With the advent of mechanical cleaning devices and appurtenant washing equipment, the operation of grit chambers has been greatly facilitated. Where head is available, the use of channel-type grit chambers with proportional Sutro weirs is apparently increasing. In this type of basin the decomposition or organic material with the mineral matter can be kept at a minimum. Where head is not available, stirring devices may accomplish the same end. Aeration through diffuser plates or perforated pipe is not successful as a means of holding the lighter materials in suspension. Plates and pipe are covered with heavy material which completely stops operation.

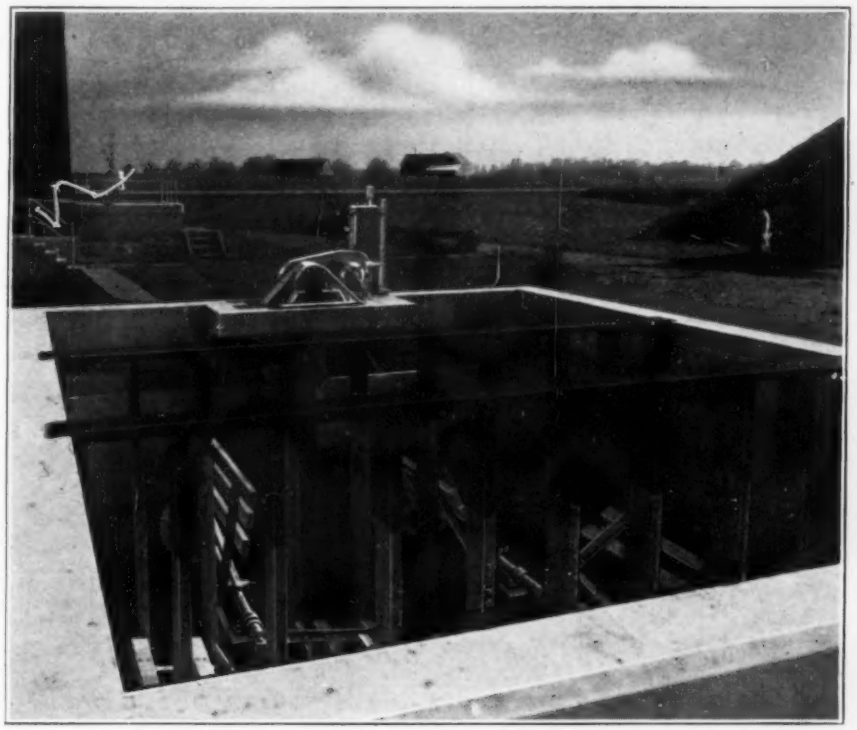
Washed grit is suitable for use as fill. Unwashed grit can be incinerated with sewage sludge on hearth-type incinerators unless its volume is too great.

Grease and Grease Removal

The present emergency has called attention to the value of grease in the war economy. Properly designed grease traps are effective in the removal of grease from the wastes from large messes and restaurants. To accomplish removal through surface natation the wastes must be cooled. Cooling can most economically and wisely be effected by retention. Retention implies capacity. Military experience indicates that grease trap capacity must be provided in terms ranging from several gallons per capita served in small eating establishments to one gallon per person, or possibly somewhat less, for very large messes. Lack of comprehension of these facts has produced a surprising number of grease traps of little or no practical value.

It has long been recognized that grease and oil are unwelcome components of sewage in final treatment processes. They should therefore be removed by pretreatment as effectively as is reasonably possible. The best means of such removal is still a moot question. Much of the grease in sewage will normally be deposited with the sludge in sedimentation basins. Some will rise to the surface where it can be removed by mechanical sweeps. For this purpose fine sprays have been found to be particularly effective.

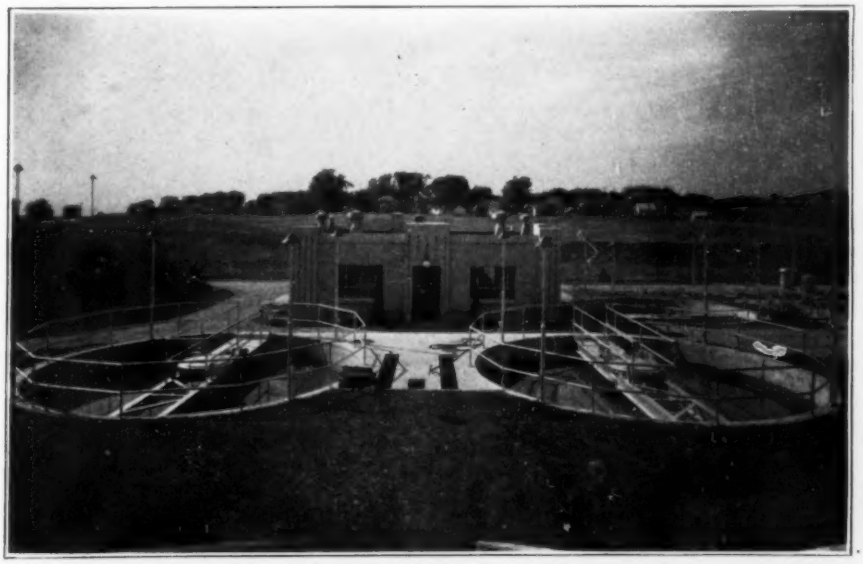
Air, plain or chlorinized, will undoubtedly bring additional grease to the surface. The expediency of its use must perhaps be determined by economic consideration plus the particular advantage to the final treatment process ensuing from especially complete grease removal.



Chain Belt "Slo-Mix" Flocculating Unit at the New Plant of Troy, Ohio

Primary Sedimentation

Recent progress with respect to sewage clarification through sedimentation is represented by the use of mechanical flocculation, the better control of short-circuiting, and the improved placement of effluent troughs. The efficiency of well designed settling basins has been



Neat and Compact Combination Treatment Plant of Plainview, Minn.

Provides two-stage biofiltration for a combination of domestic sewage and cannery wastes. A Danco Flocculator ahead of the primary tanks provides for supplementary chemical precipitation when canning wastes overload the plant.

gradually increased through attention to the factors just referred to. The principal criterion of subsidence efficiency, of course, is the extent of removal of the suspended solids. With most fresh sewages B.O.D. removal follows proportionally.

The employment of mechanical flocculation is gradually increasing. It is not necessarily effective with all sewages. Best results seem to be secured with fresh sewage and with sewage to which excess activated sludge or humus from trickling filters is returned. In determining in advance whether or not mechanical flocculation will be advantageous it is obvious that the character of the sewage must be known and pilot plant experiments should be considered.

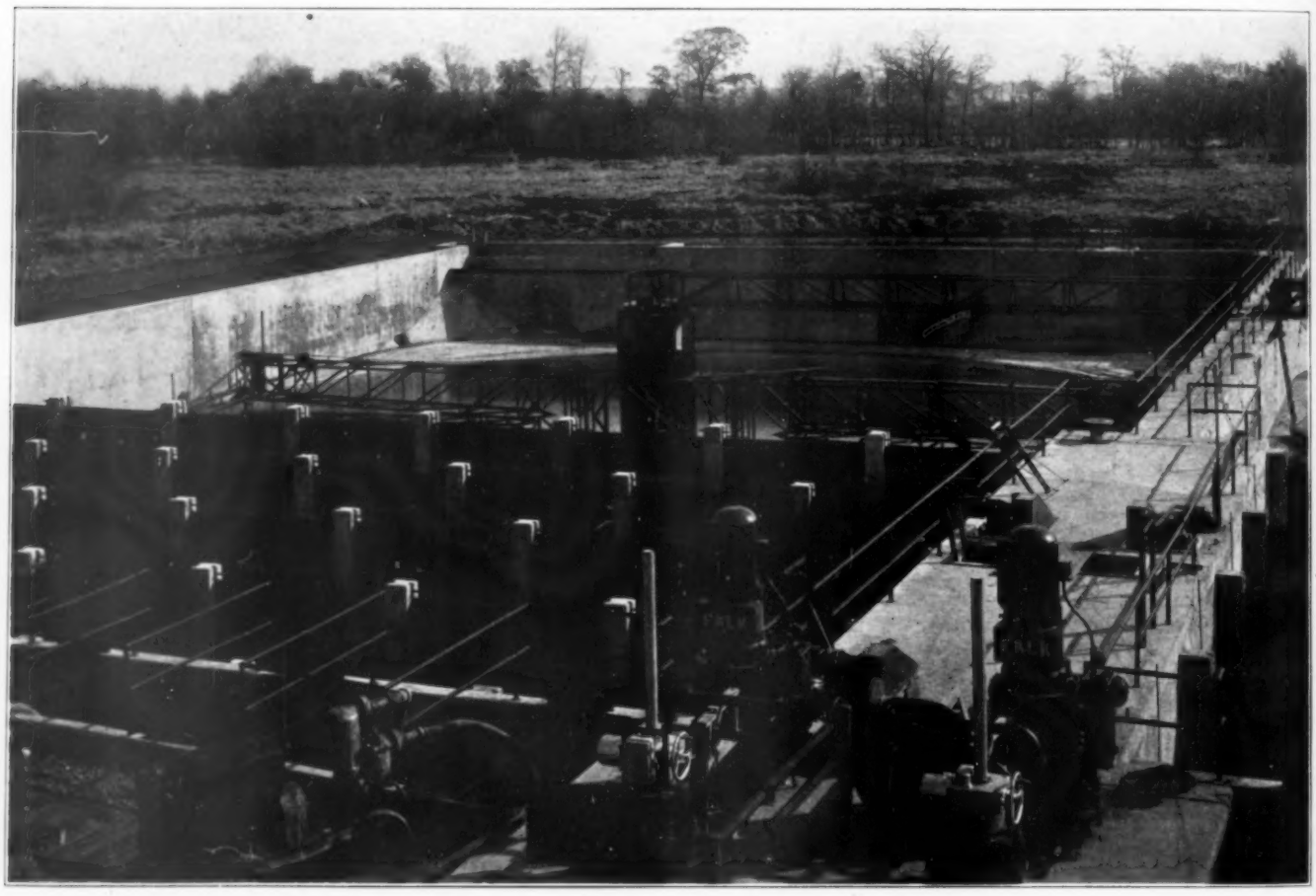
It is astounding that the designing engineers have paid so little attention to short-circuiting in settling basins as related to shape, inlet arrangements, baffles and outlet trough or weir arrangements. It is commonly reputed that baffles are of little or no value. Such conclusions can only arise from a lack of comprehension. First, as to what functions baffles can perform, and, second, as to what type of baffle can be employed to diffuse the sewage throughout the transverse section of a settling basin.

Much can be accomplished in primary, as well as secondary sedimentation basins, by proper take-off arrangements. It will generally be found, unless rectangular tanks having a high ratio of length to width are employed, that suspended troughs properly located upstream from the outlet ends of sedimentation basins, will be more effective than weirs.

Secondary Sedimentation

A notable achievement in the design of a secondary subsidence tank has been made by Gould and associates at the Bowery treatment works in New York. One of the new principles involved is based upon conclusions which indicate a sludge current along the tank bottom in the direction of flow of from five to ten feet per minute, from which it was deduced that attempting to drag the sludge to the inlet end of the tank was "bucking the current". Reasoning from this, the direction of flight travel was reversed and the sludge removal hopper placed at what would ordinarily be the effluent end of the tank. The results were highly satisfactory and resulted in sludge being removed from the tank after a shorter period away from oxygen supply than previously and, consequently, in much better condition. It was also determined that there is a reversal of current along the surface of the tank, in the direction of travel of the returning flights, which assisted in grease and scum removal. It was also observed that the clearest water in the tank was at or near the influent end of the channel. For this reason, effluent launders were placed at the surface near the inlet. The results indicate that a better effluent is obtained in this type of tank for a given overflow rate. This, in turn, is conducive to economy in tank size. [An article revealing the design and operating results with these secondary tanks of radical design departure will appear in an early issue of this magazine.—Ed.]

The Hays process of contact aeration prescribes intermediate subsidence between the first series of contact plates and the second. This



Plant Providing Industrial Water from Sewage Plant Effluent

Chemical precipitation plant at Sparrow's Point, Md., which will convert 30 mgd. of effluent from the Baltimore, Md. treatment plant (trickling filter effluent) into industrial water. Another 20 mgd. is also to be supplied from the Baltimore activated sludge plant.

operation, which is not included in other two-stage processes, is designed to protect the second stage contact plates from the slimes discharged from the first where different organisms thrive.

Chemical Treatment

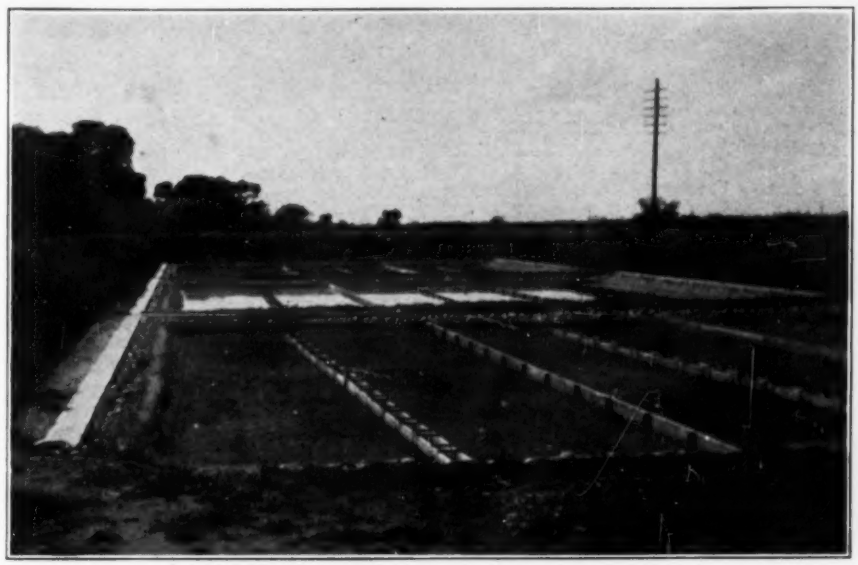
Other than experimental work upon the use and economy of chemical coagulants, including the reuse of return sludge, the principal interest in chemical sewage treatment is afforded by the construction of a ferric chloride plant in a southwestern cantonment during 1942, where conditions were favorable for disposal of the effluent through an otherwise ordinarily dry arroyo, with desert percolation and evaporation. The interest of U.S.P.H.S. in precipitation and flotation studies, with chemical and other coagulants, is encouraging and will probably tend to properly evaluate this form of treatment in the general scheme of sewage disposal.

Enlargement of some cantonments due to greater massing of troops in 1943, may result in the addition of chemical coagulation to existing plants, ahead of primary subsidence, as a means of expanding the facilities by reducing the load on subsequent oxidation processes. Flocculation without addition of chemical salts, has indicated mixed results and appears to depend largely upon the character of the raw sewage.

Low and High Capacity Rock Filtration

The standard, or low capacity rock (trickling) filter, has been adapted at some points in England to stage filtration. Effluent from subsidence tanks is applied to a primary filter and flows thence to a secondary filter. Greater efficiency per cubic yard of rock is claimed for this method, particularly for strong sewages, and it is stated that reversing the order of application is likewise beneficial; that is, at times the primary becomes the secondary filter and vice versa. Dunbar beds, which combine most of the elements of slow sand and trickling filters and which are characteristic of parts of Texas and Arizona, are commanding attention as units for the smaller plants—particularly because their construction requires the use of no critical material. They are quite costly to build and the general requirement is for three beds, where the standard trickling filter would require but one. Process of application and use is to discharge clarified sewage on the surface of bed No. 1 while bed No. 2 is being cultivated and bed No. 3 is resting, or drying. The beds are used in rotation. Effluent is excellent as a rule; particularly if ordinary care in operation is followed and the filters, while expensive, are simple of construction and operation costs a minimum. A small plant at Tempe, Arizona, visited about once a week by an operator, is consistently producing an effluent in which B.O.D. and suspended solids are reduced in excess of 90 per cent.

High capacity—high rate—rock-filters have maintained their popularity particularly as treatment units for troop encampments. Present emphasis is being placed upon simplicity of design, particularly since it

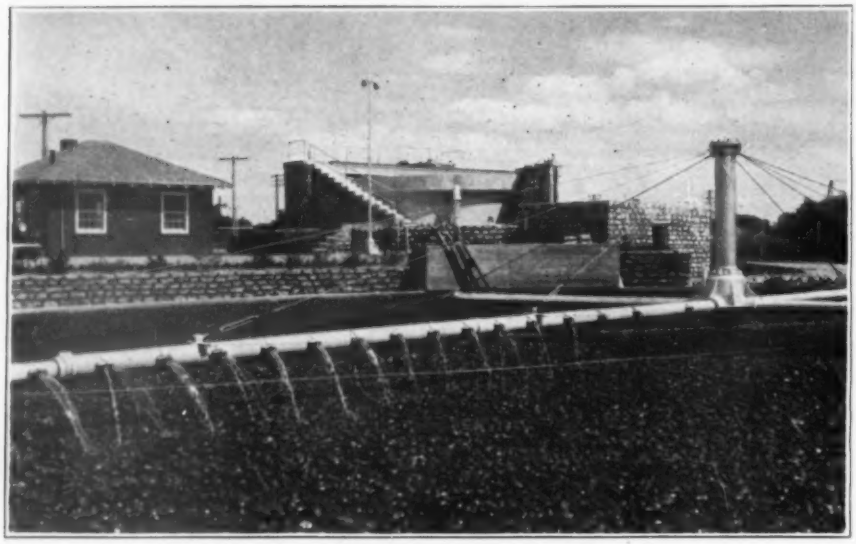


The Dunbar Beds of Tempe, Arizona

Once popular as a combination of trickling filter and contact bed these Dunbar Beds were all but forsaken for the newer trickling filter. In the Southwest a number of these units have long given satisfactory performance, however. The center bed is in use while the far bed is drying out and the near bed has been cultivated for aeration and is ready for use in the rotation of units.

"A House by the Side of the Road"

How far different is this 1942 version of a sewage plant than those of even a decade ago. This neat "emporium" was built beside the road into Cokato, Minn.—Main St. a little further in perhaps. It serves as an excellent example of inexpensive structural beautification with the use of architectural concrete. It houses a small centrifugal type "Aero-filter" providing high rate—high capacity treatment in small space.



The Picturesque Plant of Brighton, Colo.

The settling unit in center background is a 1942 version of the Imhoff tank —the two-story Dorr "Clarigester" providing clarification in the upper compartment and mechanical transfer of solids to the digestion compartment beneath.

has been determined that no greater efficiency results from the use of multi-stage units, for other than very strong wastes, than their single stage counterparts. So many of these high capacity units have been built and are now in operation that an unusually fine opportunity is afforded to judge the merits of the several processes; of which there are three in general use. The Repair & Utilities Branch of Army Engineer Corps, responsible for plant operation, is making much data available to the profession. It has been noted by those in charge that the high capacity filter process has not wholly solved the filter fly problem.

Activated Sludge and Contact Aeration

During 1942, research in activated sludge treatment has revealed some interesting phenomena. *Sphaerotilus Natans*, long deemed the cause of sludge bulking, are indicated as not necessarily the cause but a corollary of bulking. Floc formation and consequent clarification have been noted as accelerating in the presence of certain specie of protozoa. The significance of this latter discovery is not readily apparent. Chromium salts from accelerated war industry operations are detrimental to nitrifying organism in activated sludge. Two ppm may reduce or even stop nitrification. Ten ppm is highly detrimental.

With one or two exceptions perhaps, no new activated sludge plants have been noted as completed during the year and, because of high construction costs and the extensive use of critical materials, it appears doubtful that new activated sludge plants will be constructed until the present emergency is over; however, operators and research workers continue to step up the process in existing plants. One item worthy of note is the use of chlorine applied at intervals to clean air diffuser plates. At Cleveland, Ohio, a most complete method of plate renovation by acid-air-water purging has been developed.

The Hays process of contact aeration, comparatively little known outside of the State of Texas in 1941, has been expanded during the past year to meet the needs of many small cities and a number of Army cantonments. It is undergoing the customary "growing pains" of a process originally built to treat sewage in quantities less than 1 m.g.d and suddenly expanded to serve soldier populations of 40 to 50 thousand. It depends for its efficiency upon three stages of subsidence and two of contact aeration. Unfortunately there was little concrete information to base early factors of design upon. With the accumulation of data from existing plants, the underlying principles may be judged and the process evaluated by comparison with others tending to produce similar results. The process appears to be basically sound. Plants so far constructed are universally located in Southwestern states.

The Mallory Process

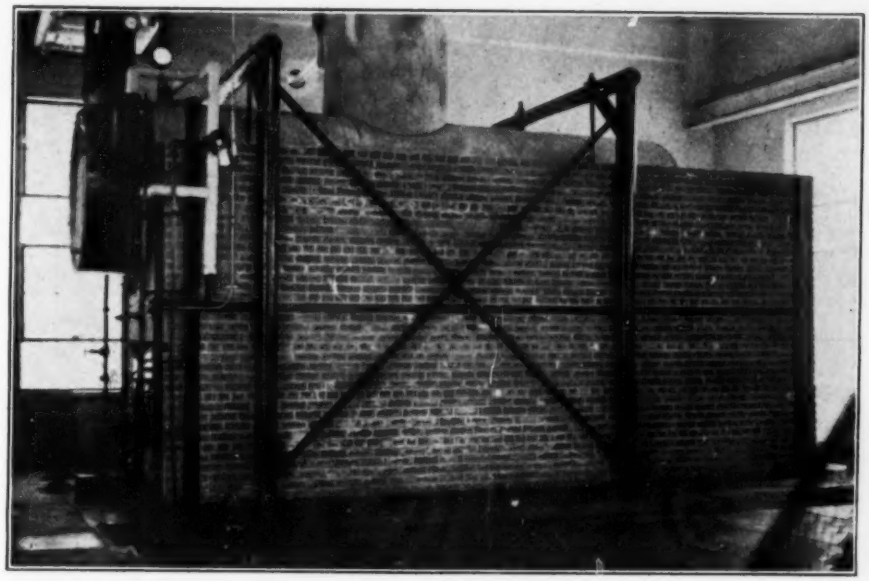
The Mallory sewage treatment process combines "regenerative digestion" and "oxidized sludge". Applied to milk waste treatment in a Pennsylvania and a Michigan factory it is said to be meeting with exceptional success. A new and interesting set of indices are presented as a means of plant control. These appear at first glance to be highly complex formulae but are, in truth, quite simple, and are said to accurately indicate plant condition and capacity. The process is reported to be producing wholly satisfactory and dependable results at a midwestern municipal plant but operating data has not been published to date.

Important Any Time—More Important in Wartime

Is the conservation of fertility values of sewage sludge, when put in proper condition for distribution and use as a soil improver and booster of yields from war gardens. This picture is of the Appleton, Wis., sludge disintegrator, which boasts a back-log of orders for "Appcolizer."

Sewage Sludge and Power Generation

While the picture, with respect to sludge disposal, has not changed materially during the past year, there appears a tendency to recognize unusual fertility values in digested sludge, and this in turn may account for a trend toward digestion in lieu of dehydration and/or incineration of raw solids or their disposal by barging to sea. The increasing popularity of internal combustion gas engines as power generating equipment using sludge gas for fuel is another potent factor in support of sludge digestion. In fact, it appears difficult to support any other method for plants of small or moderate size. Local conditions and the availability of low grade fertilizer markets are more potent factors in large sewage works where conditions may continue to favor incineration of raw solids or their disposal at sea. The current fertilizer market cannot be taken as a criterion of the future, nor as a basis for the design of future works. Such emergencies as the present tend always to accelerate agricultural production and create a favorable fertilizer market.

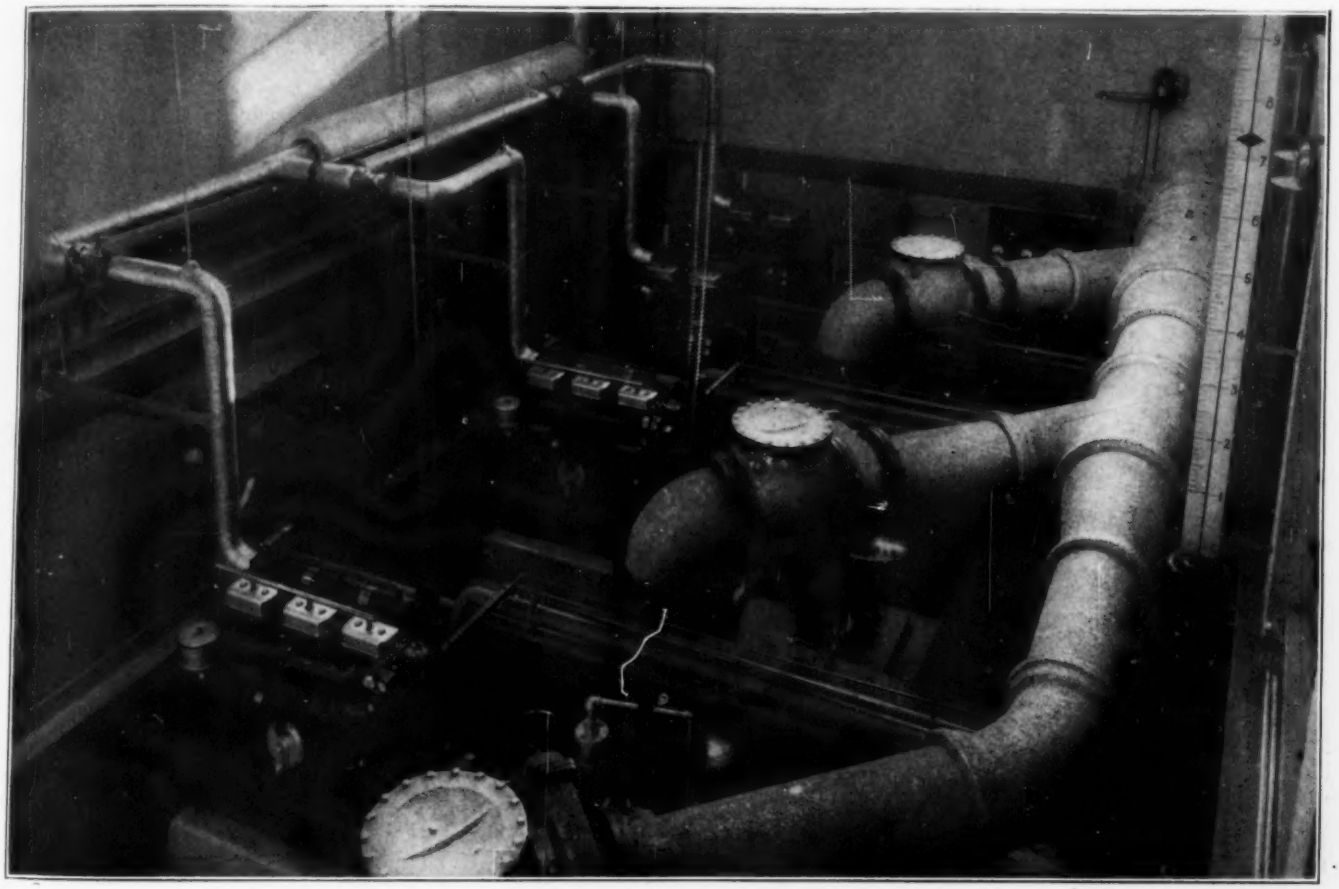


Doing with Less Critical Materials

This 70 hp. boiler, installed to supply live steam for direct heating of sludge input to coil-less digesters, is one of Los Angeles County's contributions to the war effort. To avoid new construction a sedimentation tank was wood covered for conversion to a digestion unit.

Sludge Preparation for Dewatering

That mechanical dehydration of digested sewage sludge is aided by elutriation and the reasons why, are gaining in recognition. The process obviously effects a material saving in the amount of conditioning salts needed to render the digested solids



And—More Conservation of Important Scope

This 1942 view of the gas engines of the Aurora, Ill. treatment plant pictures the "climaxing" chapter of engine by engine installation from a proving demonstration (in chapter one) to complete independence of outside power and a net saving of $6,700 annually, representing a 36.5% return on investment — another Walt. Sperry achievement.

A Triple-Purpose Chlorinator Installation

At the Dallas, Texas, plant this combination of dry and solution feed chlorinators provide flexibility in odor control, "aero-chlorination," disinfection, and chemical precipitation when and if the latter is required.

readily filterable. Experimental data are available to indicate that a saving in chemicals may likewise be effected if the time between the application of the chemical to the sludge and filtration is reduced to a minimum.

Wherever conditions are favorable, air drying in uncovered, drained or undrained beds offers greatest economy.

Dialysis in sludge conditioning holds promise as competitive with chemical conditioning. Experimental investigation appears to give it the advantage in cost and end product.

Chlorination

The role of chlorine in sewage treatment assumes added significance as restriction in plant construction and expansion becomes more stringent. For years chlorine has been the "great leveler" in sewage disposal, and as treatment plants have followed solider concentrations into new and unusual places in and out of watershed areas, or as urban overcrowding has taxed local sewerage facilities, chlorine has been increasingly applied to reduce plant loadings, separate grease, control sludge bulking, relieve filter ponding, effect sterilization of effluent to protect marine life, bathing areas and water supply streams. Its needs and adaptability are recognized by WPB, which agency in allocating chlorine supply has applied to it for such purposes a rating equal to that given for its use in water treatment.

Immediate Future and Post-War Problems

Until the national emergency is ended the situation, with respect to civilian pursuits, is bound to be grim and those charged with construction, operation and maintenance of sewers and sewage treatment and disposal works must prepare to face conditions calling for great individual initiative, ingenuity and resourcefulness. Materials and equipment will be scarce or unobtainable, and manpower of all description at a premium. The situation even now is perplexing and cannot hope to improve until it is a good deal worse unless some miracle ends what looks like a long war.

Agencies are even now preparing for post-war construction of public works to absorb excess labor, while war industries are being converted to their peaceful counterparts. The last war and its aftermath—particularly the critical situation which developed in the early 1930's—are too fresh in the minds of responsible citizens to admit of the nation entering the next post-war era unprepared for the readjustments which are bound to be involved.

During the past decade States and their political subdivisions have been taught to look to Federal authority for assistance in ventures having as objectives the amelioration of distress, or the planning and construction of public works designed to absorb excess labor. If that policy persists in the coming period of readjustment, one may look for powerful Federal agencies, endowed with immense resources, designed to guide post-war public construction actively along lines dictated by some national policy. That the thoughts of the legislative and executive branches of the Federal government turn to post-war public construction as a national venture, is evidenced by early attempts to set up in the National Resources Board a post-war planning group and the introduction of measures in the House and Senate for similar activities under a different guise.

It is not at all unlikely that public construction, during the interval immediately following this war, will be guided and in part financed by Federal authority, and it would be unwise for sewerage authorities to let the war's end find them without definite plans for the construction of needed works which have necessarily had to be postponed during the war period. It is to be hoped, if the work is handled under the supervision and with the help of Federal agencies, that a strong national policy defining what may or may not be included will be established, and that Federal authority will concern itself with the policy and not attempt to organize duplicating technical groups in regional and national offices to check and recheck engineering plans and specifications.

It Could Be!

"Say Governor; could you spare a dime for an old chlorine sales-manager?"

A.W.W.A. BOARD ACTIONS

Taken at Its Annual January Meeting in New York City

S. B. Morris chosen for Presidency; S. F. Newkirk, Jr., for Vice-Presidency; W. W. Brush for Treasurer.

THE annual meeting of the Board of Directors of the American Water Works Association, held in New York City on January 18 and 19, was attended by thirty of its thirty-four members.

The first order of business was its selection of nominees for President, Vice-President and Treasurer for the year beginning with the close of the next annual meeting of the Association in Cleveland, Ohio, June 16-18, 1943.

New Officers

Perhaps there is nothing in a name, but it is of interest that two "Sams" were chosen for President and Vice-President, the following being the official nominees who automatically become elected on March 1, 1943, unless the membership at large nominates contestants of its choice prior to that date.

For President

Samuel B. Morris,
Dean of Engineering,
Stanford University, California.

For Vice-President

Samuel F. Newkirk, Jr.,
Engineer and Superintendent,
Board of Water Commissioners,
Elizabeth, N. J.

For Treasurer

Wm. W. Brush,
Editor, "Water Works Engineering," New York City.

(Prior to becoming *Dean* Morris, "Sam" was for several years Chief Engineer and Superintendent of the Water Supply System of Pasadena, Calif. Fact is, Pasadena named a dam which he engineered and built in his honor. The Morris Dam was dedicated by Herbert Hoover, another distinguished California engineer who became a President also, only to return to his and Sam Morris' Palo Alto with relish.)

New Honorary Members

The Board chose the following members for bestowal thereon of honorary membership at the 1943 annual meeting. The citations read:

George C. Bunker, Consulting Engineer, now residing in Caracas, Venezuela, a member of the Association since February, 1911. A North American engineer of great competence who for many years has practiced his profession in Central and South America, bringing honor to himself and to his native land.

William R. Conard, Engineer and Consultant of Burlington, N. J., a member of the Association since June, 1904; past Chairman of the New Jersey Section and a leader in important standardization work of the Association; for more than fifty years a testing engineer whose independent judgment has been accepted both by manufacturers and consumers.

William W. Hurlbut, Assistant Chief Engineer and General Manager of the Bureau of Water Works Supply, Department of Water and Power of Los Angeles; member of the Association since May, 1924, Director 1934 to 1936 and 1938. President in 1937; recipient of the Diven Medal in 1941 and the Fuller Award in 1941; honored in the field of water supply engineering and particularly distinguished for his leadership in the development of specifications and standards for steel water pipe.

A.W.W.A.'s. "Sams"

S. B. Morris, Dean of Engr'g, Stanford Univ., (Nominee Pres.)

S. F. Newkirk, Jr., Supt. of Water, Elizabeth, N. J. (Nominee V.-P.)

New Honorary Members

George C. Bunker, Consulting Engr., Caracas, Venezuela

Wm. R. Conard, Engr.-Consultant, Burlington, N. J.

Wm. W. Hurlbut, Asst. Chief Engr., Los Angeles

Devendorf Diven Medalist

The John M. Diven Medal, which is awarded to that member performing an outstanding service in the field of water supply, was voted with the following well earned citation and commentary to—

Earl Devendorf for his fine leadership of the Mutual Aid Activities in the State of New York. As Associate Sanitary Engineer of the New York State Department of Health and later State Water Coordinator, Mr. Devendorf has organized the Mutual Aid Program upon a fully cooperative basis, bringing into the work a large number of members of this Association who are water works executives in the state. Participating with these water works executives have been many engineers of New York State Department of Health who, to the degree that they have contribufed to the Mutual Aid Program, share in the honor conferred upon the recipient of this award. The development of the Mutual Aid Program in the water works field has been a conspicuous activity in many states and is, in effect, the most outstanding service and advancement in the field of the year. Likewise, therefore, all other state leaders in Mutual Aid are honored by the conferring of this medal upon Mr. Devendorf.

The Diven Medal is presented at the closing ceremonies of the annual meeting of the Association.

Goodell Prize to Langelier and Ludwig

The Goodell Prize, to the author (or authors) of the most merito-

rious paper of the year to appear in the Journal, was voted to Co-authors W. F. Langelier, Associate Professor of Sanitary Engineering, University of California, and Harvey F. Ludwig, former student under Prof. Langelier. The citation reads to—

Wilfred F. Langelier and Harvey F. Ludwig for their paper in the March, 1942, issue of the Journal entitled "Graphical Methods for Indicating the Mineral Character of Natural Waters." In this paper the authors review the various methods that have been offered for graphical presentation of data related to the mineral content of water; describe a single point method for graphing and classifying waters for mineral content; and exhibit a classification of 68 large U. S. water supplies based upon their method. The paper is considered a fitting addition to water examination literature to which Professor Langelier has already made a significant contribution in his previous (1936) paper entitled "The Analytical Control of Anti-Corrosion Water Treatment."

New Awards for Membership Promotion Won by Booker and Berry

The Membership Promotion Awards were established only last year. The first recipients are Warren H. Booker (North Carolina) and A. E. Berry (Canada). The awards go to those two members responsible for bringing in A. W. W. A. the greatest number of new members during the year. The Secretary reports that—

W. H. Booker, State Sanitary Engineer of North Carolina, is the winner of the first prize—one United States War Bond having a maturity value of $100. Mr. Booker has personally and by correspondence carried on a vigorous campaign to bring members into the Association. His interest has been particularly directed toward the establishment of Corporate Memberships in the municipalities of North Carolina. Seventeen such memberships were obtained by him during the year. He was also responsible for the obtaining of nine Active Memberships, all fully paid.

A. E. Berry, Secretary of the Canadian Section, is the winner of the second prize—$25 in cash. He has personally endorsed the applications of 13 Active Members and two Corporate Members, all fully paid. Dr. Berry's continued promotion of the American Water Works Association is fittingly recognized by this award.

Surplus Water Works Inventories Important Topic

With some concern and considerable debate and questioning of W. P. B. representatives and President

Medalist and Prize Winner

Earl A. Devendorf, (State Water Coord.) State Dep't Health Albany, N. Y. (The Diven Medal)

W. F. Langelier Assoc. Professor Univ. California Berkeley (The Goodell Prize)

Wolman, who is serving the W. P. B. as special Consultant and Adviser on Water Supply, the Board gave careful consideration to the non-availability up to the day of the meeting of a means by which water works men, anxious and willing to level off their surplus inventories, might do so to bring their supplies within the limits allowed in Preference Rating Order P-46, under which they now operate. The Board authorized Secretary Jordan to bring before the proper officials in the War Production Board the following important resolution:

Whereas, the Board of Direction of the A. W. W. A. has asked its

Award Winners

Warren H. Booker, Chief Engr., N. C. State Dept. Health, Raleigh, N. C. (StateWaterCoord.)

Dr. A. E. Berry, Chief Engineer, Ont. Dept. Health, Toronto (Secy., Can. Sec.)

Committee on Wartime Activities to investigate and report upon the disposal of surplus water works inventory items; and

Whereas, the Committee finds that a revision of WPB order P-46 is in preparation and will shortly be issued and that any suggestions which might be made relative thereto could probably not receive consideration at this late date; and

Whereas, it is understood that the proposed revision has given consideration to interlocking provisions governing purchases of needed items and disposal of surplus items which it is hoped will effectively move surplus inventories into useful channels; and

Whereas, it is the opinion of this Committee that the present regulation of the Office of Price Administration No. 204 establishing ceiling prices for surplus inventories items is one of the deterrents to the prompt disposal of surplus inventories,

Therefore, this Committee recommends that the Secretary be instructed to request the WPB to endeavor to have the OPA revise this regulation so as to provide a simpler and more equitable method of compensation for water works surplus items. It suggests cost plus handling charges.

It is the opinion of the Wartime Activities Committee that no further action should be taken at this time. The Committee will maintain close contact to observe the effectiveness of the revised P-46 and will report to the Executive Committee if occasion requires.

The Wartime Activities Committee further recommended to the Board of Direction that Secretary Jordan be instructed to advise the membership that in order to comply with the provisions of P-46 each water works should work out with its legal counsel steps to be taken to put into effect emergency procedures which will enable them to purchase or sell surplus inventory materials when expedient or necessary to do so.

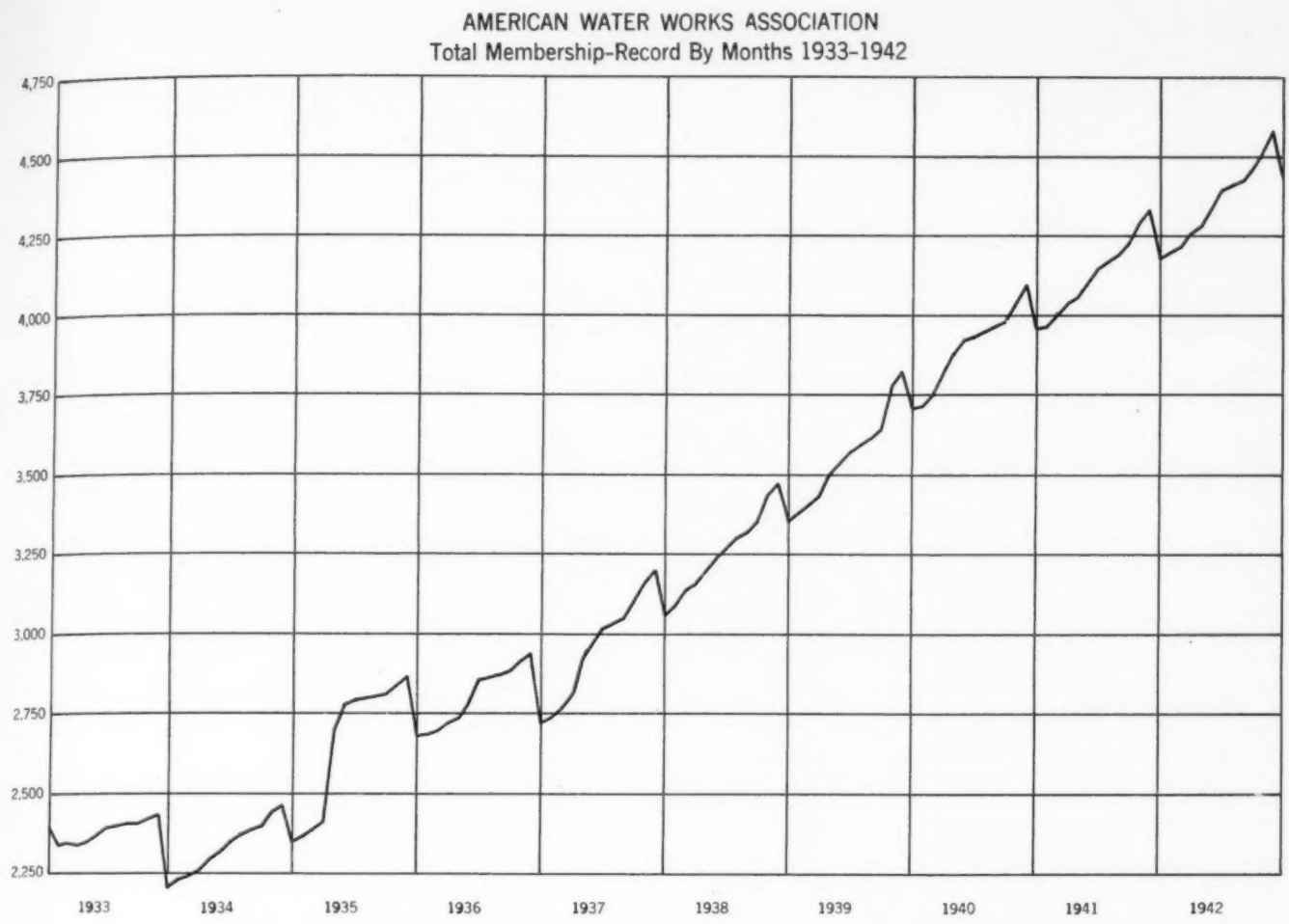
Water Works Practice Committee Activities

Following Chairman Pirnie's report of activities of the Water Works Practice Committee, the discussions by the Board yielded the following more important decisions.

Action on Asbestos-Cement Pipe Specifications was deferred indefinitely.

Steel Plate Pipe Specifications (as submitted by the Committee) are to be amended in line with certain suggestions and then sent through the approval routine. They will be published as soon as approved.

Specifications for Coal Tar Dip Coatings for Cast-Iron Pipe were discussed at some length. Further



A Picture of What Is Happening to A.W.W.A. in the "Jordonian Era."

discussion is to be made a part of the General Conference in June.

Reinforced Concrete Pressure Pipe Specifications were modified in certain details and accepted. The document will be sent to the Board for approval and thereafter published in the Journal.

Membership Growth Record Becoming Spectacular

As a part of the report of the Secretary, the Board paused to admire a spectacular graph depicting membership growth of A. W. W. A. during the past 10 years. This graph, which reveals a steady growth for the past 9 years, shows that the membership (now 4,441) has something more than doubled since 1934.

1943 Conference Assured

One of the last acts of the Board was that of making it positive that the 1943 annual meeting (War-Winning Conference) will be held in Cleveland, Ohio, June 16-18, and to hear from Chairman Enslow of the Program Committee and Secretary Jordan a preview of topics to be featured on the Technical Program.

Please Correct!

(And Oblige the Author)

Mr. A. B. Kozma, author of the article on "Design of Sludge Digestion Tanks for Efficient Gas Production," on page 25 of our January issue, has uncovered some errors in figures used in making computations and deriving formulae, which escaped the author's notice in the retyping of his transcript.

If the reader will make the following corrections in the article, the author will appreciate it.

Under the heading "Hot Water Heating Systems" (p. 26) the value of (C) in center column should be 22 rather than 3.73. This in turn changes the reduced value used in the equation (3a) from 3, as shown, to 15.

Farther down the value of (r) should be 500 rather than 6500, which was a bad piece of typewriting and the stray 6 wasn't removed.

In the paragraph next following, the water velocity through the pipe coils, correctly figured, is 0.29 ft. per sec. and the recirculating rate becomes 38 gals. per minute instead of the 44 shown.

Wartime Meter Design Saves 70% of Bronze—Not a Mere 20%

We are sorry to admit an error in typesetting which was not detected in proofreading our January issue.

In Mr. Weir's review of "Developments of the Year in Water Supply" it was stated in a caption under the picture of Wartime Water Meters that in redesign to produce the Victory Models a saving of 20 per cent in war-needed bronze had been realized. Truth of the matter is, in 1942 meter manufacturers were producing meters requiring 70 per cent less bronze, as a contribution to the war effort. The typesetter evidently thought that this was an improbable figure, so proceeded to credit meter producers with a 20 per cent reduction as a more understandable cut. Regardless, however, the 70 per cent figure *is* correct and meter manufacturers objected considerably to having their contribution reduced by us to the paltry 20 per cent credited—and we can't quarrel with them for intimating that this error should be corrected.

WAR AND POST-WAR PROBLEMS TOPIC OF NEW YORK MEETINGS

N. Y. Sewage Works Association and Sanitary Engineering Division of the A. S. C. E. Hear Present and Future Status of Sanitation Discussed

By HARRY A. FABER*
Associate Editor

BY PLANNING the winter meetings of the New York State Sewage Works Association in New York City to follow by a day the full day meeting of the Sanitary Engineering Division of the A. S. C. E. a rich and varied two-day program is offered each January to engineers and plant operators. The exceptionally large attendance at these meetings, on January 21st and 22nd, proved that the importance of such an opportunity was recognized.

Under Linn H. Enslow, Executive Committee Chairman, presiding at sessions of the Sanitary Engineering Division, so many valuable technical papers were presented that a review only of this part of the meeting can be presented in this issue. The second installment of this report, which is devoted to the meeting of the New York Sewage Works Association will follow in the March issue.

Proceedings of the Sanitary Engineering Division of the A. S. C. E.

On the day before the Sanitary Division's technical sessions the Rudolf Herring Medal was presented during the annual award ceremonies of the Society to Robert T. Regester, Baltimore Consulting Engineer, who is chairman of the division's Committee on Activated Sludge Practices. Mr. Regester received this award for his work as chairman of the committee and his paper, "Activated Sludge Practices," which was printed in the Society's 1942 issue of Transactions.

Executive Committee Members

N. T. Veatch, Jr.
Consulting Engr.
Black & Veatch
Kansas City, Mo.

R. F. Goudey
Sanitary Engr.
Bureau of Water
Los Angeles

Linn H. Enslow
Editor
New York City
(Retiring Chrm.)

A. Clinton Decker
Sanitary Engr.
Birmingham, Ala.
(New Chairman)

Resolution Directed to W. P. B.

Linn H. Enslow, Chairman of the Division, announced that the Board of Directors of the Society had considered a resolution offered by the Executive Committee of the Division, and had endorsed and passed it as a resolution of the Board of the Society, rather than as a Division resolution.

This resolution calls on the War Production Board to establish an improved method of handling and dealing with the sewerage requirements of the country—something in the same direction that has been accomplished through the establishment of the Water Production Section in the Power Branch of W.P.B. for handling water supply problems. In the Governmental Requirements Branch of W.P.B., which has been assigned sewerage since the appearance of the revised P-46 Order on October 10, 1942, nothing comparable in sewerage with the work of the Water Production Section, staffed with experienced water works men, has been accomplished.

On advice of the two members of the Sanitary Division's Executive Committee serving the W.P.B. as consultants on sewerage matters—Linn H. Enslow and George J. Schroepfer—that more efficient handling of this important phase of sanitation was needed in the W.P.B. than now existed, the resolution was drawn. This resolution which went to the head of the Governmental Requirements Branch, to Donald Nelson, as chairman of W.PB., and to the President of the United States, follows in full.

WHEREAS, the continued and satisfactory operation of public sewerage systems and sewage treatment works has been recognized as being essential to the successful prosecution of the war effort, and

WHEREAS, the public health and welfare of a civilian and military population of more than 75,000,000 depend in large measure upon the effectiveness of the operation of such public sewerage systems and treatment works, and

WHEREAS, it is necessary that adequate supplies be made available to maintain and operate successfully these necessary works, and

WHEREAS, although it has been possible up to this time to obtain reasonable quantities of the necessary materials and supplies, it is feared that a critcial situation may develop unless the sewage works

Executive Committee Members

Geo. J. Schroepfer
Chief Engr.
Mpls.-St. Paul San. District
St. Paul, Minn.

Gordon M. Fair
Professor
Harvard Univ.
Cambridge, Mass.

*Research Chemist, The Chlorine Institute, Inc., New York, N. Y.

field is given proper representation in the organization of the War Production Board,

NOW, THEREFORE, BE IT RESOLVED by the Board of Direction of the American Society of Civil Engineers that consideration be given by the War Production Board to the prompt and effective establishment of a Sewerage Section in the Bureau of Governmental Requirements, or some other Branch of the War Production Board and that the staff of such Sewerage Section be composed of persons experienced in this field and fully familiar with its needs and requirements.

[Essentially the same resolution was also passed by the Executive Committee of the Federation of Sewage Works Associations meeting in New York on January 20th, —Ed.]

Officers of the Division

The retiring chairman announced that the Executive Committee had elected as his successor A. Clinton Decker, San. Engr., Tenn. Coal, Iron and Ry. Co., Birmingham ,Ala., and Ray F. Goudey, Sanitary Eng'r, Los Angeles Bureau of Water Supply, as Secretary of the Division.

The new member on the five-man Executive Committee, which runs the Division's affairs is Professor Gordon M. Fair of Harvard University. The other members are N. T. Veatch, Kansas City Consulting Engineer, and Geo. J. Schroepfer, Chief Engr., Minneapolis-St. Paul Sanitary District, who is also President of the Sewage Works Federation.

Annual Joint Dinner

The annual joint dinner of the Sanitary Engineering Division and the N. Y. State Sewage Works Ass'n was held on January 22—the evening of the Sewage Works Ass'n meeting.

Speakers included Ezra B. Whitman, President of A.S.C.E., George T. Seabury, Executive Secretary of the Society, and Abel Wolman, president of the Am. Water Works Ass'n, as principal speaker. This feature of the two meetings will be covered in the second installment of the report scheduled for our March issue.

Technical Papers

(Of the Sanitary Engineering Division, A.S.C.E.)

"Waste Disposal in Army Cantonments," by J. L. Vincenz, Repair and Utilities, U. S. War Department, Washington, D. C.

At army camps, according to Mr. Vincenz, refuse is mostly disposed of by incineration or by land fill methods. But such refuse is considerably dryer than that generally handled at municipal incinerators. Thus, mixtures whose characteristics are about 20% wet material to 80% dry material (by weight) or perhaps 25% to 75% must be handled in army incinerators. Since incinerators ordinarily are designed to handle refuse in which the ratio in 35% wet to 65% dry, entirely new problems of operation, maintenance and repair must be met.

The land fill (sanitary fill) method

Richard H. Gould
Chief Engineer
Dept. of Pub. Wks.
New York City

Col. T. H. Wiggin
Consulting Engr.
Fed. Wat. Serv. Co.
New York City

of refuse disposal, as developed at Fresno, Calif., has proven thoroughly successful for army camp use. In this method, slightly different handling schemes are employed for camps less than 2,000 in population than for those greater than that number. Parallel fills of refuse about 10 feet wide and 6 feet high, partly in a trench and partly above ground, are made in the smaller camps; somewhat wider fills (20 ft. by 6 ft.) are used in the larger camps. These fills are separated and covered by two feet of earth fill.

Moving of earth is the smallest part of this job. For the smaller camps, a 35 to 45 horsepower bulldozer blade with a clamshell lip is employed, while a power shovel with a dragline bucket is most efficient for the larger jobs. Of extreme importance is the compacting of refuse (after depositing each 3 to 4 feet of depth) to 50% of its original height. The small amount of earth required for separating and covering refuse is obtained from a new trench.

Detailed instructions for this simple disposal method are given in an army utilities manual. Experience has shown flies are held to a minimum and a much higher degree of sanitation is reached than in previous wars.

Mr. Vincenz, in reply to a question by *N. T. Veatch* (Kansas City) said that rainy weather was no deterrent to operation of the land fill method. *A. J. Lizee* (New York City) explained that such disposal has been practiced every day in the year by New York City where nearly sixty thousand cubic yards of refuse are daily handled by dragline equipment.

In reply to a question by *E. Sherman Chase* (Boston), Mr. Vincenz pointed out that there is no experience with this method in locations where frost penetrates more than two feet, incinerators being preferred for such cold locations. The original use of land fill disposal at Fresno was carefully surveyed for rat control during the first five years and investigation showed no breeding occurred.

"Performance of Final Settling Tanks of Novel Design," by Richard H. Gould, Division of Engineering, Dept. of Public Works, New York, N. Y.

Units to provide secondary treatment at the New York Bowery Bay plant were placed in operation during the spring of 1942. Flows of about 80% of the 40 m.g.d. designed capacity are now treated by activated sludge. The aeration tanks at this plant provide step-aeration through four passages, the first being for sludge reaeration and settled sewage being added in the second, third, and fourth passes. Dissolved oxygen is maintained at all times; about 1 ppm. in the first pass and 3 ppm. at the effluent end.

The final settling tanks are unique in having the mixed liquor enter at the bottom and in being equipped with sludge scrapers which move settled sludge to the effluent ends of the units. Mr. Gould pointed out that conventional settling tanks, in which sludge is moved toward the influent end, may provide a sludge thickening effect by the return of old stale sludge solids. On the other hand, by moving settled solids in the same direction as the natural flow of sewage, a remarkably fresh sludge is obtained. On many occasions a dissolved oxygen content of 1 ppm. or more is found to be present in this sludge. While eventual concentration of activated sludge is generally required, final settling tanks need not be required to serve this double purpose.

Sludge scraper flights move along bottom at a velocity of about 3 feet per minute and are feathered on the return trip (this latter has been found unnecessary if flights are raised to return near the surface). Effluent weirs are provided in the last 40% of tank length. Since the

clearest supernatant is generally found near the influent end of settling tanks, however, effluent weirs will be provided even closer to the influent end in future designs.

Plant capacities are: primary settling tanks, 1 hour detention; aeration tanks, 1.5 hours (would be 2.5 hours on conventional basis); final settling tanks, 1.7 hours; air consumption averages 0.59 cu. ft. per gal. Suspended solids of 197 ppm. in raw sewage are reduced to 12 ppm. in the final effluent, and raw B.O.D. of 145 ppm. is reduced to a final B.O.D. of 15 ppm.

Mr. Gould explained, in reply to a question by *A. L. Genter* (Baltimore), that concentration of solids in the return sludge averaged only 4000 ppm. and, to *L. H. Enslow* (New York), that this was accomplished by a sludge return of 45%. *Prof. Barnes* (Cleveland) pointed out that the use made by Mr. Gould of cellophane floats suspended at different levels, for timing velocity of travel, actually measured density currents and predicted such studies will greatly increase knowledge of tank characteristics.

Mr. Enslow commented that the most remarkable feature of the unique settling tanks described by Mr. Gould was the removal of sludge actually containing dissolved oxygen.

Wiggin Again Reviews Water Supply Progress

"Report of Committee on Water Supply Engineering," Thomas H. Wiggin, Chairman, Consulting Engineer, New York, N. Y.

Mr. Wiggin, who has previously received the Rudolph Herring medal for his excellent reviews, presented the last committee report in 1939. Hence, the present review covered progress during the past three years. While it was described as a brief record, only a few of the most outstanding comments can be mentioned in this report.

The three-year period saw the tapering off of governmental expenditures and the rise of war time construction. Water supply development for army camps, bases, and the enlargement of public and private supplies took place. Statistics show large increases in the production of all types of pipe, with the development of pre-stressed reinforced concrete pipe and of extruded cement asbestos pipe.

Priorities problems were discussed as a statement for the record. Examples were quoted of the delays involved in construction, not as criticism, but as an incurable condition of material scarcity. A few of the more notable water supply projects completed or under way were mentioned: Grand Coulee Dam, Shasta Dam, Colorado Dam, and the New York City Delaware aqueduct. Industrial expansion in Detroit has required the replacement of many water mains, and in Houston the development of a 20-mile distant industrial supply to supplement the overworked ground water supply.

New problems of guarding water utilities against sabotage, of decontamination, and of precautions against bombing attacks have developed. No shortage of water purification chemicals has materialized, though a "war alum" has been introduced, and the trend toward higher doses of chlorine has not stopped.

Dr. W. Rudolfs
Rutgers Univ.
N. Brunswick, N. J.

A. L. Genter
Consulting Engr.
Baltimore, Md.

Droughts, floods, and water shortages in the past two years received special mention. There has been a tendency to make spillway design more liberal as floods continue, but the degree of protection afforded must be considered relative and the degree of probability should be investigated.

Genter Presents Formula For Sludge Conditioning

"Calculating Coagulant Requirements in Sludge Conditioning," by A. L. Genter, Consulting Engineer, Baltimore, Md.

Technical papers by Mr. Genter always are conspicuous for their originality of approach to a problem and for their contribution to our fundamental knowledge. The present one is notably so. This reviewer believes it will prove a classic of research in the field of sewage treatment if the author's data to date is further confirmed.

Mr. Genter's paper is the first successful attempt to establish mathematical relationships between certain basic sludge assays and the amounts of chemicals required to permit rapid dewatering in modern vacuum filter equipment. Despite the complicated physical, chemical, and biochemical system which exists in sludge, a number of established facts provide the necessary basis for such a relationship.

Naturally alkalinity (as ammonium and calcium bicarbonates) of the sludge accounts for a ferric chloride demand; first, to react with the natural alkalinity in solution and, second, to act directly with the alkalinity trapped within the spongy sludge solids. Reaction of ferric chloride with the bicarbonates clumps the gelatinous solids and renders pressure draining of the aggregate relatively easy. Mr. Genter shows how alkalinity may be converted to ferric chloride demand by a constant factor of 1.08.

Because the coagulation takes place in a large percentage of free sludge water, highly hydrated ferric hydroxide is produced. If solids were entirely mineral in nature, less hydration would occur. Thus, the amount of volatile matter is an important consideration. By knowing such simple plant data as percentages of solids, volatile matter in the solids, and alkalinity in the sludge water, it becomes relatively simple to estimate what the caoagulant dose will be for good vacuum filtration practice.

Mr. Genter's research with a wide variety of sludge types has shown the ferric chloride dose required for coagulation and incidental reactions within the solids to be 1.6 times the ratio of volatile to ash in the sludge solids. He has developed his formula on these basic reactions:

$$X = 1.08\,Y_1 + 1.6\,Y_2$$

X is the total ferric chloride dose as percentage of sludge solids, Y_1 is the percentage alkalinity on a sludge solids basis, and Y_2 is the ratio of volatile to ash in the sludge solids.

It is pointed out that this equation ignores particle size and filter yields, but that particle size has no effect on ferric chloride requirement other than that determined by the ratio of alkalinity. Filter yields are lower, however, when sludges contain solids of smaller particle size.

Obviously, since sludge elutriation materially reduces alkalinity and therefore one of the important ferric chloride requirements, a coagulent saving occurs. In one of the sludge studies discussed 84.3% of the total dose was found to be consumed by alkalinity alone, leaving only 15.7% of the total dose for actual coagulation. As practically all of the alkalinity factor can be displaced by elutriation, most of the ferric chloride is available for the purpose really intended, namely volatile coagulation.

Larger quantities of any other co-

agulants must be used (as compared with ferric chloride) because of molecular weight relations and because of the influence of the sulfate radical on coagulation of volatile matter. Comparisons of such coagulants show their use is economically possible under certain conditions when priced at less than half the cost of anhydrous ferric chloride and when the sludge is both digested and elutrinated.

The clearer understanding of sludge conditioning reactions given in this paper points the way to an accurate evaluation of sludge behavior toward ferric chloride and of sludge processing economics. The publication in full of Mr. Genter's paper should earn from operators and engineers a sincere vote of thanks.

Paul D. McNamee, Chief Chemist District of Columbia Sewage Treatment Plant, Blue Plains, D. C., discussed this paper. The Genter equation and laboratory tests at his plant indicate too high a dose of ferric chloride is being used; this is due to mechanical feeding difficulties which necessitate maintaining the coagulant dosage for the highest sludge load even though this load may be widely fluctuating. The elutriation process has accomplished savings larger than those which should theoretically result. For the first time, now, plant operators can know the optimum conditions at which to aim.

Practice and Economy of Sludge Concentration (A Symposium)

In this symposium an outstanding group of engineers and plant operators presented the present concensus of facts, opinions, and controversy.

R. F. Goudey, Sanitary Engineer, Bureau of Water Works and Supply, Los Angeles, Calif., described some of the earliest experiments in sludge concentration. These were conducted during 1930-34 at Los Angeles in a 0.2 mgd. sewage treatment plant of the activated sludge type. Bulking of sludge and methods of preventing bulking were studied in detail. Mr. Goudey considered bulking largely as a physical phenomenon, since it can be brought about long before bacterial action could be responsible.

Three extended experiments were devoted to the concentration of a fresh (one third) and activated sludge (two thirds) mixture. These involved decanting, return of sludge to the primary clarifier, separate sedimentation of return sludge with chlorination of the supernatant liquid. The latter method was adopted at the city of Phoenix, Arizona, plant and sludge concentration up to 15% solids proved feasible.

C. E. Keefer, Associate Engineer, Bureau of Sewers, Baltimore, Md., told of considering two methods of sludge thickening in 1933 when making extensions to the Back River treatment plant. Centrifuges, then under test at Lima, Ohio, were investigated but were not considered satisfactory. Removal of large sludge

Wellington Donaldson
Director
Bureau Sew. Treat.
Dept. Public Wks.
New York City

C. E. Keefer
Asst. Chief Engr.
Bureau of Sewers
Baltimore, Md.

solids was essential and the use of screens (finally down to one-sixteenth-inch openings) for that purpose made operation too complicated.

Finally, two sludge thickening tanks 26 feet in diameter and 16 feet deep were provided. Each was equipped with scraper mechanism making one revolution in 15 minutes, and with facilities for chlorination of the supernatant liquor through eight surface nozzles. Utilizing a 13-foot depth of sludge, 160,000 gal. is treated daily at a rate of 300 gal. per sq. ft. per day.

Solids in the thickened activated sludge average 1.4 to 2.1 per cent, which represents a 75 to 88 per cent solids reduction. The chlorine dose ranges from 10 to 29 ppm. No relation has been found between the volatile content of the sludge and the degree of thickening accomplished. The installation and operation of such units is considered well worth while, even though a higher degree of solids concentration was expected.

Willem Rudolfs, Chief, Department of Water and Sewage Research, New Jersey Agricultural Experiment Station, New Brunswick, N. J., pointed out that the character of sludge affected its compacting. The rate of compacting decreases with an increasing concentration of solids and with settling time. Temperature also influences concentration — denser summer sludge being more readily handled.

At the Elizabeth, N. J., Joint Meeting Plant, where sludge is pumped through a 4,000-foot 20-inch diameter line, this effect of viscosity is important: at 75° F. pumping, time required is 60 minutes, but at 53° F. the time increases to 120 min.

Flotation with chemicals has been investigated as a dewatering process. Acids may be used to react with alkaline materials, produce minute gas bubbles, and float the solids. The use of calcium hypochlorite as a flotation reagent produces a dense layer of activated sludge. Concentrations of 9 to 10% solids may be produced by this means. The liquor can be readily clarified by addition of an iron coagulant, and flotation processes may compete economically with sedimentation. Sludge drainability is improved but vacuum filtration is not benefited.

W. Donaldson, Bureau of Sewage Disposal Design, Department of Public Works, New York, N. Y., explained that sludge concentration was of importance at New York plants for three reasons: to avoid chilling digesters, to save volume, and to save pumping. The sludge (plain or chemical) at the Coney Island plant averages 7.7% solids and is sent to digesters. Concentration of sludge at the Wards Island activated sludge plant is practiced to reduce volume barged to sea. One final tank is employed for thickening, and yields a 2.28% solids sludge from a 0.48% activated sludge. This, mixed with 6.33% solids raw sludge, gives a combined sludge of 4.45% solids for barging.

At the Bowery Bay activated sludge plant (operation started in March, 1942) a combined sludge of 4.03% solids is sent to digesters. It results from raw sludge of 5.38% solids and thickened return sludge (0.39% solids) of 2.4% solids. Thickening is in three concentrating units, 50 ft. diam, and 10 ft. side depth.

At Tallmans Island, the thickening tanks are 24 ft. diam. and 18 ft. side depth. Combined sludge sent to digesters is 5.94% solids; from primary sludge of 7.52% solids, and return sludge (0.51% solids) ranging from 1.35% to 3.48% solids when thickened. Application of chlorine in thickening tanks has been superseded by its more successful application directly to the incoming liquor, and is especially helpful when dissolved oxygen is low. A 75 ppm. dose is required to give 1.0 ppm. residual chlorine in the tank effluent.

Robert T. Regester, Consulting Engineer, Baltimore, Md., presented data on the use of centrifuges as a means of sludge concentration. There is no direct comparison of such results with those accomplished by thickening tanks, however, since the centrifuges do not do a finished job. Experience at the Columbus plant shows these machines are not yet sufficiently rugged. While units there have been improved to the point of operating continuously in 8 hour shifts from June through November of 1942, the drive gears, bearings, and other parts again failed. New parts are still being awaited. No operating figures are available and at present centrifuges must be considered uneconomical.

E. T. Killam
Consulting Engr.
New York City

*Robt. T. Regester**
Consulting Engr.
Baltimore, Md.

(**Rudolf Herring medalist, 1942*)

E. T. Killam, Hydraulic and Sanitary Engineer, New York, N. Y., cited experience with sludge concentration at two different plants. At Tenafly, N. J., sludge was formerly dried on glass-covered beds until increased sewage flows resulted in shorter detentions and a sludge of lower solids content. Drying beds were replaced by vacuum filters, but sludge thickening was found essential with this method also.

At the Elizabeth, N. J., Joint Meeting plant, sludge storage capacity of 1.26 m.g. is provided and sludge disposal is by barging. It is possible to obtain a sludge so high in solids that handling is uneconomical. Present sludge drawn from tanks averages 5.6% solids.

[Part II of this report, which will cover the N. Y. Sewage Works Ass'n meeting, will be printed in the March issue.]

Attractive Modern Administration Building Recently Completed by Atlas Mineral Products Co.

Atlas Boasts Attractive New Office Building on 51st Birthday

Max E. Wirtz
Founder

His many friends whom he left behind when he passed away, but a few years before his Company reached its half-century of existence, will lament the fact that Max E. Wirtz, founder of Atlas Mineral Products Co. of Mertztown, Pa., could not have lived to look upon the attractive modern administration building recently completed by the Company he started.

Founded in 1892, the original activities of Atlas Mineral Products Co. were the mining and grinding of dry earth paints and fillers, its headquarters being at Lincoln, N. J. In 1919 the main office was moved to Mertztown, Pa.

In 1915 Atlas developed its widely known G-K Sewer Joint Compound and began its manufacture. In 1929 it added *Tegul*-MINERALEAD—a sulphur base compound which now is extensively used for making water main joints.

In 1930 Atlas initiated the manufacture of *Tegul*-VITRABOND, first of a now well-rounded line of acid-proof cements and other corrosion-resistant materials of construction, widely employed in acid-proof units in steel and chemical plants.

This fine new building is a monument to the integrity and sterling character of the founder of Atlas, who put a foundation under his company in keeping with the symbolic name selected by him for it.

George Rohan New Secretary, Southwest Section

George Rohan

George J. Rohan, Superintendent of Water Works at Waco, Texas, has been made Secretary and Treasurer of the Southwest Section of A.W.W.A., as successor of the late Lewis A. Quigley, who passed away on October 30, shortly after the 1942 Annual Meeting of the Section in Little Rock, Ark.

Mr. Rohan seems particularly well fitted to take up the duties of Section Secretary, because of his intimate knowledge of activities of the Southwest Section, which he has served as Chairman and only recently as representative of the Section on the A.W.W.A. Board of Direction for the three years 1940-1942. In addition Mr. Rohan has for the past several years served on important Section Committees, including the Committee which manages the Southwest Water Works Journal.

SCRUBBING SEWAGE GAS*

Experiences With Dry and Wet Methods of Scrubbing at Peru, Indiana

By HARROLD E. NORRIS
Superintendent
DEPARTMENT OF STREETS, PARKS AND SEWERAGE
PERU, INDIANA

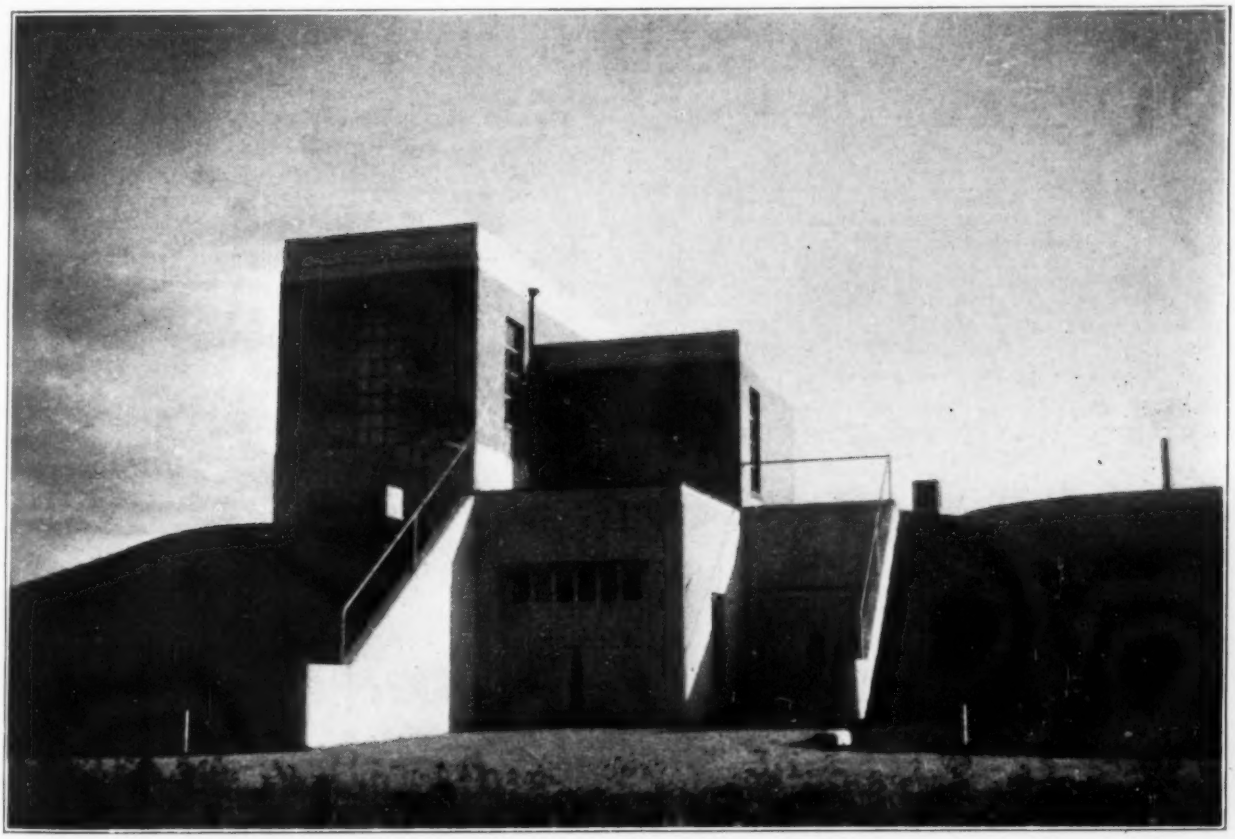
EACH year operators of sewage treatment plants are more noticeably recognizing the economic advantages in utilizing sewage gas for power production and, thereby, reclaiming a valuable by-product formerly wasted. Most designers of plants constructed in recent years have incorporated facilities for utilization of this gas, notably as an engine fuel.

The use of digester gas as a fuel has created new problems for the operator, one of which is the removal of destructive hydrogen sulphide from the gas. This must be done before the gas can safely be used as a fuel for either gas engines or in boiler operation. This impurity, above all other impurities found in sewage gas, will cause serious damage in the nature of corrosion and pitting, as well as other damage to metal surfaces in which it comes in contact. Excessive hydrogen sulphide is likewise very detrimental to lubricating oils used in gas engine operation.

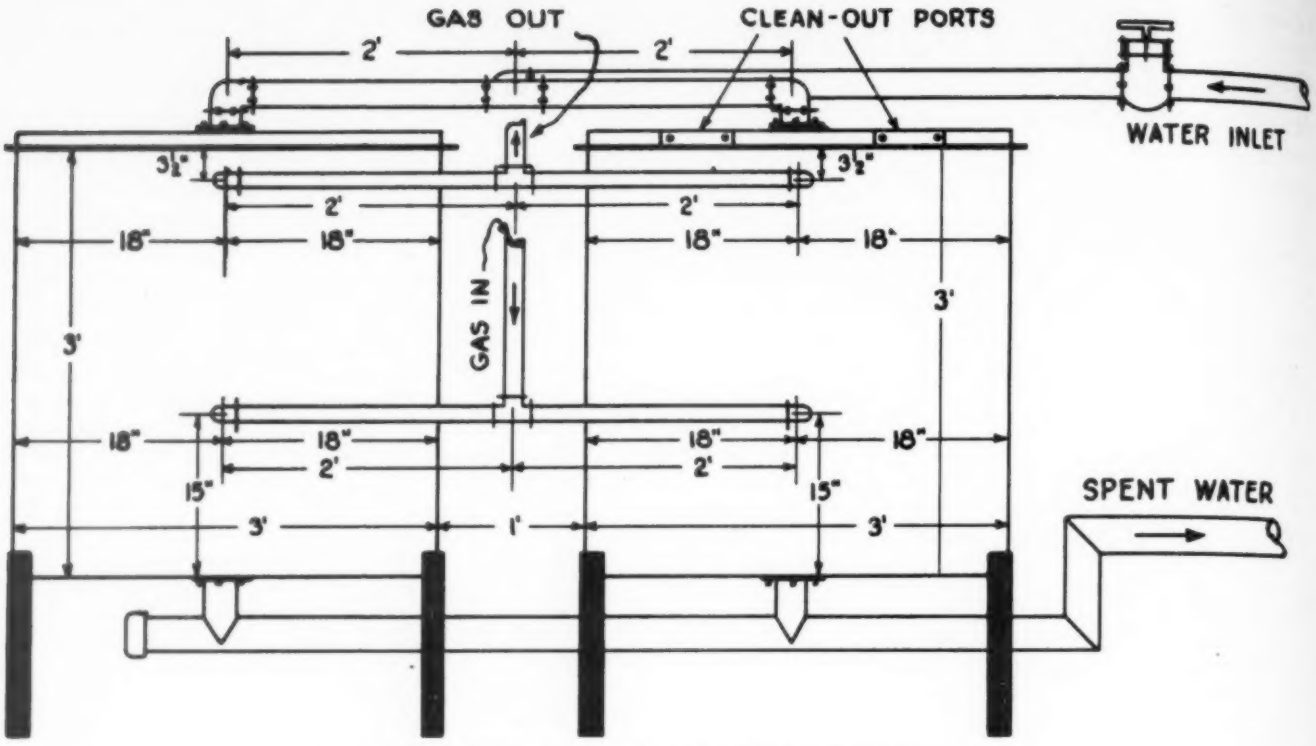
The amount of hydrogen sulphide in sewage gas varies, but in most plants is usually not above 100 grains per hundred cubic feet of gas. In order to remove this impurity, gas scrubbers have been provided in plants of recent construction. These gas purifiers make use of the so-called "iron-sponge" as the scrubbing medium. This dry scrubbing method in most plants is very practical. In the process the gas from the digester is passed through closed containers filled with "iron sponge," this material being pulverant ferric oxide (Fe_2O_3) mixed with hardwood shavings.

Peru's treatment plant was constructed with this type of scrubber. These scrubbers are two in number and are cylindrical in shape. They are so connected that they can be used either in parallel or series, singly or in by-passed operation. Their capacity is 13 bushels of "iron-sponge" each. The gas consumption when the 45 horsepower Worthington engine is in use is approximately 16,000 cubic feet per day. With a hydrogen sulphide content of 100 grains per hundred cubic feet there would be approximately 2.3 pounds of sulphur to be removed each day. One bushel of iron-sponge will remove 8.2 pounds of sulphur. Thus, these scrubbers should run for about three months before the sponge becomes exhausted and recharging required. In actual practice in our plant this problem of hydrogen sulphide

*This paper was presented by the author before the Indiana Conference of Sewage Works Operators.



The Sewage Treatment Plant of Peru, Ind.
Employs the activated-sludge process; converts 16,000 *cu. ft. of gas daily into power for driving air blowers.*



Dimensional Sketch of Peru's Twin Gas Scrubbers

Wet type bubbling scrubbers in which plant effluent is utilized for the gas wash.

removal has been found not so simple because of the existence in the Peru gas of a far greater amount of sulphide than 100 grains per hundred cubic feet.

We Look for a More Satisfactory Purification Scheme

Perhaps a brief resume of the early operation of the Peru plant would best explain the reasons for and the steps leading to the finding of another method of scrubbing sewage gas aside from that originally installed.

Gas production started in the digester about the 25th of June, 1940, and has varied from 6,000 to 20,000 cubic feet per day, all depending on the type of waste being treated. The gas engine was first used on July 19, 1940. The gas at that time was tested and found to contain 135 grains of hydrogen sulphide per hundred cubic feet of gas as it came from the digesters. This was the first time that we were aware that our gas was high in hydrogen sulphide. On August 9, 1940, or about three weeks later, the gas was again tested and found to contain about the same amount of hydrogen sulphide, making it possible for the iron-sponge scrubbers to do a good job of scrubbing without depleting the ferric oxide so quickly. The local cannery started to can corn about August 10, delivering their wastes to the sewer without any pre-treatment. A few days thereafter the gas production rose very rapidly and gas consumption by the engine increased 50%, indicating a drop in fuel value of the gas. The gas was analyzed on August 21 and found to have a heating value of only 550 B.t.u.'s per cubic foot. This was explained by the fact that the gas contained 40.5% carbon dioxide.

On August 25 the gas was again analyzed for hydrogen sulphide and, with considerable surprise, was found to contain 530 grains per hundred cubic feet. One of the scrubbers was found to be removing 13.2 pounds of sulphur daily. However, the gas analysis revealed that only about 54% of the sulphide was being removed. Both scrubbers were then placed in series operation, and thereafter removed about 85% of the sulphide, thus producing an 80 grain gas for engine use. This was thought to be too high for safe operation because we had not as yet installed the Crane Oil Refiner. Consequently, we shut the engine down and did not operate it any more until we had installed the oil refiner. In the interim we did not scrub the gas and operated the heating boiler well above 160 degrees to keep down condensation, thus preventing excessive harm to the boiler, which moisture condensation and resulting sulphurous and sulphuric acid formation will cause.

I enumerate the above so as to provide the background leading up to the seeking of another and simpler method of removal of hydrogen sulphide.

High Sulphide Traced to City Water

After taking the engine out of service we continued to try to analyze our gas problem. On September 10, 1940, the hydrogen sulphide (H_2S) in the digester gas was 380 grains; on September 18 it was 250 grains; on September 26 it was 380 grains; on October 10, 350 grains; on October 23, 400 grains, and was still 400 grains on November 7, 1940.

During this period we made inquiry of many plants to see if others had this much hydrogen sulphide. We were unable to find any in excess of 100 grains per hundred cubic feet. We tested the pH of our digesters many times and found them to be neutral or only slightly acid. We finally reached the conclusion that our trouble was caused by the high sulphate content of the Peru water, which comes from deep wells. In the digestion process sulphide gas is generated as the result of bacterial activity, wherein the organisms utilize the sulphate oxygen and release hydrogen sulphide. This will occur in sulphated waters whenever sufficiently low oxidation potentials are reached.

It is thought that the addition of canning wastes to the sludge tanks makes a condition which is very con-

ducive to the rapid growth and multiplication of the sulphate splitting (hydrogen sulphide producing) bacteria. We reached this conclusion because conditions did not become really bad until the starch wastes were added. And I might add that this condition of excessive production of hydrogen sulphide increases each year when more starch wastes are added. For instance, at this period (August and September) the gas is now testing 600 grains of hydrogen sulphide. Each year after the season closes this decreases until about five months after the last starch wastes are added when a constant is reached which was found to be 310 to 375 grains in March, 1941, as against 550 grains in August, during the canning season, and a return to 370 grains in June, 1942, only to rise again to 600 grains during September canning.

Bactericidal Control Impractical

In February of 1941 we inquired of Purdue University, University of Illinois, Ohio State University, and Iowa State College as to the possibility of securing a bactericide which could be added to the digestion tanks that would stop hydrogen sulphide formation. They all replied that no bactericide was known to be selective to the extent of killing the bacteria that act upon sulphur compounds but not upon those that act upon nitrogenous compounds.

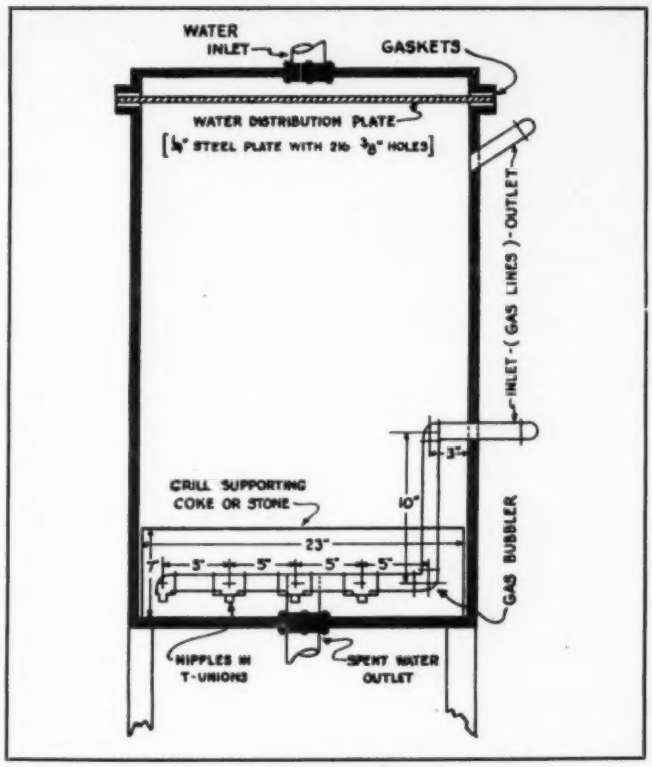
Consequently, with this avenue of approach to the problem stopped we had left two methods of approach to the solution of the problem. One was to enlarge the present iron-sponge scrubbers so they would not have to be revived so often and the other was to find some other means of providing scrubbing facilities. We chose the latter.

We Experiment with Wet Scrubbing

Knowing that hydrogen sulphide is soluble in water to the extent of about 2.9 volumes being dissolved by 1 volume of water at 20 degrees C. at atmospheric pressure, we decided to investigate the possibility of a wet gas scrubber. Hydrogen sulphide ionizes but slightly and therefore is considered a very weak di-basic acid.

As previously stated, we had made arrangements to install a Crane Oil Refiner which would permit the engine to operate safely on fuel with a larger amount of hydrogen sulphide, providing the temperature of the engine was maintained as high as possible without being detrimental to the oil. We purchased the refiner in February of 1941 and set about in March to devise some method to wash the gas with water.

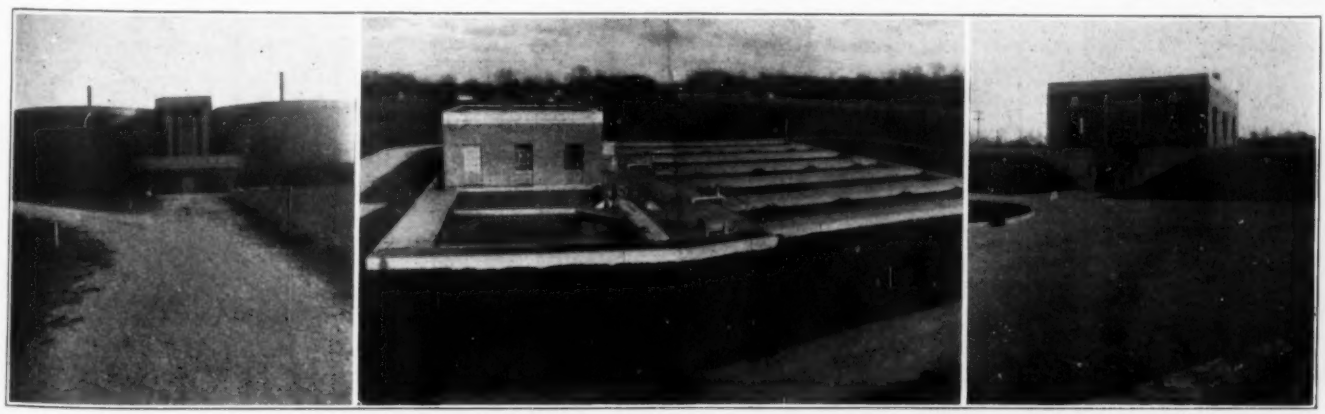
We constructed a small model gas scrubber which comprised an arbitrary design combining the bubbling principle with the diffusion tower principle. The experimental scrubber was 12 inches square and 22 inches high, setting on legs. It has a distribution plate in the top so as to diffuse the water before it falls. The piping of the water outlet is devised so as to prevent the escape of the gas. This model was tested with both city water and plant effluent to determine its scrubbing capacity. Different sizes of stone were used as the contact and filming out medium. The small stone gave greater efficiency, but too great a loss in gas pressure. Actual tests proved that because of the short contact period of the water and gas in the scrubber, it took about 8 gallons of water to remove the hydrogen sulphide from one cubic foot of gas containing 360 grains per hundred cubic feet, or approximately 9 gallons for a 400 grain removal.



End View Section Through Scrubber

Note submerged bubbling orifice jets pointing down at elevation below rim of out-flow riser pipe.

Since our use requirements of sewage gas in the engine was from 12 to 15 cubic feet per minute (and even as high as 18 cubic feet per minute during canning seasons when carbon dioxide in the gas is high) we decided to make a scrubber at least 18 times as



Some Views of the Peru Plant

Digestion Tanks—General View of Aeration Tanks—Power House.

large as the test model or one that would handle 18 cubic feet of gas, which would require 162 gallons of water per minute. If this was to be taken from the city water supply, the cost of the water would be prohibitive; consequently, we decided to use plant effluent and located our scrubbers so that the normal head on the effluent trough would be ample to force the water through the scrubbers and avoid pumping. We found that we had sufficient space where the scrubbers were to be located to make them larger. Therefore, we built two units, each of which will handle about 150 gallons per minute. They operate in parallel. However, we find that because of a further reduction in detention time in the scrubbers their actual capacity is somewhat reduced and that we do not actually have a scrubber of the capacity comparable to our test model. With both units of this scrubber working in parallel, it will remove 500 grains of hydrogen sulphide from 100 cubic feet of gas at a rate of gas consumption of 12 cubic feet per minute.

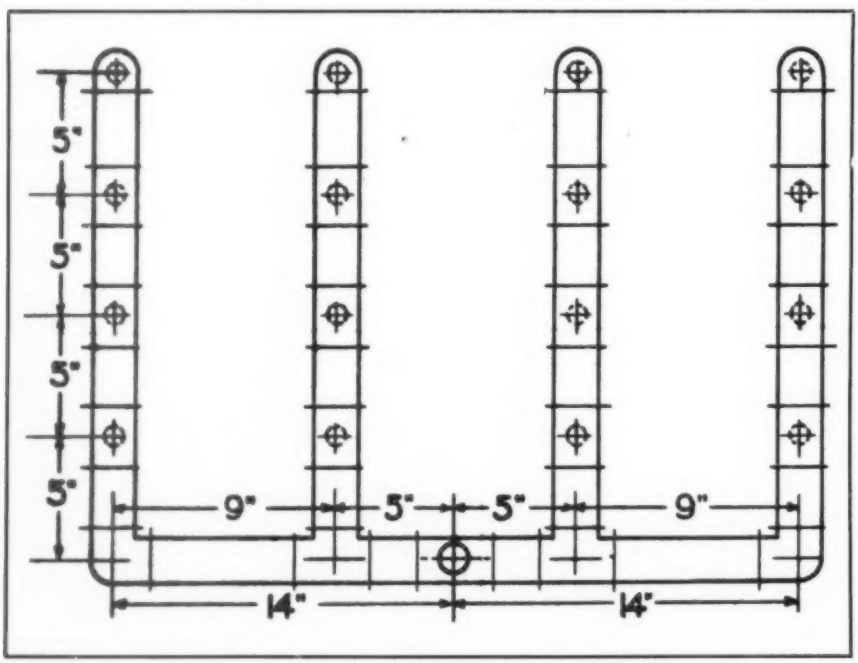
At the time this scrubber was constructed the hydrogen sulphide content was such that sufficient amounts could be removed from the gas for good engine operation. But as previously stated, the sulphide content is now greater than ever before and under present conditions only about 80 to 85% of the H_2S is being removed, indicating that if we do not have a rapid decrease in H_2S as soon as the canning season is over, an additional scrubber may have to be provided. But this possibility of additional installation is not likely inasmuch as, even under the present extreme conditions, our gas is being reduced to 100 grains per hundred cubic feet. If our plant arrangements were such that we could use the wet scrubbers in series with and ahead of the dry iron-sponge scrubbers, we would seemingly have an ideal combination.

The installation of this scrubber which uses plant effluent for the removal of hydrogen sulphide from the sewage gas at the Peru Sewage Treatment Plant has made possible the use of the gas engine, which otherwise would not have been possible. When this gas engine is in operation it means a saving on the power bill for the plant of approximately $300 per month. This is because this engine replaces a 40 HP. motor in operating an air blower for furnishing air to the aeration tanks in the activated process. It can be readily seen that this scrubber installation has already in a short period of time paid for itself many fold.

Scrubber Details

The operation and description of the water scrubber (see sketches) is as follows:

Each scrubber is made of ¼ inch steel plate and is 36x24x36 inches in height. They are constructed on legs made of 2x2x¼ inch angles, 13½ inches long. The water from the effluent trough of the secondary settling units enters the convex lid through a 4 inch line provided with a valve. The water must pass through a perforated ¼ inch steel plate containing 216 holes of ⅜ inch diameter. This plate serves two purposes, one to catch any large particles and the other to disperse the effluent evenly over the top of the scrubber before it falls to the bottom. There is a grate, or grille, made of ½ inch steel bars properly spaced, located 7 inches from the bottom. This false bottom supports 2½ to 5 inch stone, which fills the scrubber to within 8 inches of the top. This stone films out the water as it flows through the scrubber, lengthens the contact time, and enables the water to dissolve more hydrogen sulphide. After the water falls to the bottom of the scrubber it flows through a 5 inch vertical overflow pipe located in the middle of the bottom. This overflow pipe extends 3 inches above the bottom of the scrubber box so as to provide a depth of water of 3 inches plus the height of the crest over the overflow pipe. These overflows or outlet pipes are connected to a common pipe which has a rise of 1 foot at the discharge end, so as to provide a water seal against a gas pressure up to 12 inches of water column. The gas to be scrubbed enters the side 15 inches above the bottom through a 2 inch pipe. This pipe branches off into four branches. Each of these branches is provided with four ½ inch submerged openings which extend downward into the water in the bottom of the scrubber. The gas must bubble through the water before it passes up through the trickling stone contact bed. After the gas reaches the top of the scrubber it is piped to the gas engine and boiler.



Plan of Gas Bubbler Grid

Located beneath grille forming false bottom for support of bed of coke or other contact media.

It is interesting to observe that about 75% of the hydrogen sulphide is removed by bubbling and only about 25% is removed in its passage through the contact bed above. The convex top of each scrubber is provided with two clean-out holes for removal of scum formations on the diffuser plate.

Mr. Earl Tyner, Jr., former chemist for the sewage plant, and now a Second Lieutenant in the United States Army, assisted with the design of this scrubber. Mr. Donald Sharp, machinist for the plant, did all the construction work in building these scrubbers. Due credit is extended to these men in the wet scrubbing of sewage gas as now practiced at the Sewage Treatment Plant of Peru, Ind.

WEST VA. WATER CONFERENCE ON WAR TIME OPERATION

Emphasis on Theory and Practice of Maintaining Water Systems for the Duration

By HARRY A. FABER*
ASSOCIATE EDITOR

IF KNOWLEDGE is a tool, those superintendents and operators attending the Fourth Joint Meeting of the West Virginia A. W. W. A. Section and Conference on Water Purification returned home with a full kit of tools. The cold hard facts of priorities, scrap needs, and material shortages provided a background of *why* and *what* serious situation faces the water works field. Definite methods of extending the useful life of water works materials provided the *how* of meeting this serious condition.

Chairman-Elect
Prof. H. W. Speiden
Dept. of Civil Eng.
Univ. West Va.
Morgantown

Secretary-Treasurer
J. B. Harrington
Dir. Div. San. Eng.
State Dept. Health
Charleston

One hundred and fourteen members and guests registered at the meeting in Parkersburg, November 12 and 13, 1942. Under Golden Underwood, Chairman, and the program committee consisting of H. K. Gidley, Gilbert L. Kelso, H. W. Speiden and J. C. Edwards, a full program was presented. A pre-conference get-together, with buffet and entertainment on the evening of November 11, started things moving; the annual banquet on the last evening concluded a full and busy two days.

Technical papers were grouped so that the morning session of the first day covered the operation of water systems and water purification plants; the afternoon session covered mutual aid, salvage, and priorities. On the second day a symposium on "Extending the Useful Life of Water Works Materials" occupied the morning, while a round-table discussion of break-point chlorination and an inspection trip to the Parkersburg Water Works rounded out the afternoon.

Two motion pictures in color were shown: "Bill Jones Joins the A. W. W. A. and Attends the National Conference in Chicago," which W. A. Welch, Industrial Chemical Sales Division, West Virginia Pulp and Paper Company, presented; "The Construction and Installation of the Stone Canyon Reservoir Supply and Outlet Lines," presented by The Barrett Division, Allied Chemical and Dye Corporation.

Fuller Award to Hetzer

Mentor Hetzer was designated to receive the 1943 Fuller Memorial Award for his section. Mr. Hetzer, chairman of the award committee, was absent because of illness, and Perkins Boynton, Clarksburg, who announced the award, said that the committee reached its decision without the knowledge of its chairman.

New Officers

The following officers were elected to serve for the following year:

Chairman
H. W. Speiden,
Dept. of Civil Engineering,
West Va. Univ., Morgantown.

Vice-Chairman
J. C. Edwards,
Chemist and Asst. Manager,
Huntington Water Corp.,
Huntington.

Secretary-Treasurer
John B. Harrington,
Director, Div. San. Engineering,
State Health Dept., Charleston.

National A. W. W. A. Director
T. L. Young,
Manager, South Side Water Co.,
Chester.

(Term begins at close of 1943 A. W. W. A. Conference, to succeed John Harrington, the present Director.)

Trustee
D. V. Moses,
Chem. Engr., E. I. du Pont de Nemours and Co., Charleston.

The two trustees continuing in office are Kenneth Waldeck, Shepherdstown, for one year, and Paul D. Simmons, Weirton, for two years.

Technical Papers

"Waste Water Survey at Wheeling," by W. G. Yates, Construction Engineer, City of Wheeling, W. Va.

Mr. Yates recited a commendable instance of "locking the barn before the horse is stolen," in describing the savings accomplished by a Pitometer survey. Wheeling has a population of 61,000 served by a distribution, pumping and purification system of capacity more than adequate to meet the average daily demand. The supply of raw water from the Ohio River is in no danger —is inexhaustible. Before installation of meters, the average demand was 16 mgd., but metering reduced this to 9 mgd.

Fuller Award
Mentor Hetzer
Mgr., Moundsville
Water Company
Moundsville

Vice-Chairman
J. C. Edwards
Chem. & Asst. Mgr.
Huntington Water
Corp., Huntington

In 1941 the Pitometer Company was engaged to survey the distribution system, measure leakage, test pump efficiency, and recommend improvements. Twenty-four hour flow records were obtained in each of fourteen distribution districts. Whenever the night rate was found to be high in ratio to the total consumption, districts were subdivided and checked in detail. One leak of 0.26 mgd. from a four-inch main was found to be discharging into a sewer through which the main passed.

Originally only 62.5 per cent of the water pumped could be accounted for, but now 82 per cent can be. All leaks coming under the city's responsibility (except reservoirs) were promptly repaired. Consumers

*Research Chemist, The Chlorine Institute, Inc., New York, N. Y.

on whose property leaks were found were given ten days to make repairs. All valves were operated, repairs were made on those in poor condition; concealed valve boxes were found and made accessible; and errors in distribution system maps were corrected.

But these benefits were not all. By assigning a value of five cents per thousand gallons to water saved, Mr. Yates concluded that the annual saving in water amounted to over $31,000. Not content with this accomplishment, Wheeling has since obtained equipment to make its continuing surveys of the system.

Perkins Boynton
Supt. Filtration
Water Board
Clarksburg

Maj. W. W. Towne
Regional Engr.
U.S.P.H. Service
Cleveland, Ohio

"Developing a Large Underground Water Supply for Industrial Use," by G. E. Hauer, Water Supervisor, General Chemical Defense Corporation, Point Pleasant, W. Va.

Typical of many new industrial water supplies, the West Virginia Ordnance Works required a large water supply in a short period of time. The Ranney water system appeared an ideal method of obtaining water from the valley of shale rock where glacial melt water was stored.

Mr. Hauer described the Ranney water collector which, like any other well, is first of all a hole in the ground. Near the bottom of the hole, which is lined with concrete and may vary from 75 to 150 feet in depth, pipes are jacked out radially for an average distance of 200 feet into the water bearing strata. Throughout the length of the slotted screen pipes, water flows into the well from which it is pumped for use. Test data at this installation showed a delivery of 5,500 gpm. for each of three wells located 2,500 feet apart.

At the Point Pleasant plant, 13-foot diameter wells with 18-inch reinforced concrete walls were sunk by excavating inside the caisson. Five-inch strainer pipes, with slots 2 inches by ⅜-inch, were pushed out horizontally through 6-inch pipe openings provided in the bottom section of the caisson by means of 100-ton jacks. Three more similar wells are being constructed. Top of the concrete structure is 44 feet above flood level, with a pump-room floor of reinforced concrete, also above flood level.

Construction of these wells was well illustrated by means of lantern slides. Bacteriological quality of the water is maintained by chlorination, the chlorinator discharge being delivered to the deep well turbine pump suction.

"First Year of Operation—Beckley's New Water Supply," by E. E. Chandler, Chemist, Beckley Water Company, Beckley, W. Va.

Mr. Chandler described the Beckley filtration plant, which provides aeration, mechanical mixing, sedimentation, circular welded steel filters, Palmer filter sweeps, and superchlorination for treatment of a highly colored surface water. A 20-mile square watershed supplies about 44 mg. of impounded water. An average consumption of 1 mgd. is required for serving about 6,000 consumers through 100 miles of distribution system.

The raw water contains about 2.0 ppm. of iron, 1.8 ppm. of manganese, and its color resembles strong tea. From October 8, 1941, to January 1, 1942, the average dose of alum was 7.6 grains per gallon for color removal. The finished water characteristics were: color 0, hardness 82 ppm., pH 8.2, and residual chlorine 0.11 ppm. The hardness of the raw water was only 26 ppm.

On January 8, superchlorination to the break-point was adopted, a dose of 1.5 to 2.0 ppm. carrying a residual of 0.8 ppm. through the settling basins and of 0.3 ppm. through the filters. The alum dose was spectacularly reduced from better than 7 grains to 1 grain per gallon under this treatment, and the finished water was treated with a final dose of chlorine and ammonia. During the spring season, color and taste increased in intensity until the chlorine demand was higher than the capacity of the chlorinators could provide.

Finally, the chlorine demand of 100 pounds per million gallons (12 ppm.) was satisfied by applying a part of the dose in the gaseous state directly through a diffuser. Gradually the chlorine demand has decreased until now only 4.5 ppm. for break-point treatment is required. This treatment provides not only good color removal, but practically complete elimination of iron and manganese.

In reply to questions, Mr. Chandler explained that the raw water reservoir is only about one year old and that the site had not been stripped. The manganese content varies from 0.3 ppm. near the surface to 1.8 ppm. at the mid-level to 3.0 ppm. at the bottom. Considerable trouble at the intake was caused by algae growths, but estimates indicated that application of copper sulfate would have been more expensive than superchlorination at the plant.

Mutual Aid and Priorities

"The Mutual Aid Program," by W. W. Towne, Sanitary Engineer (R), U. S. Public Health Service, Regional Sanitary Engineer, Office of Civilian Defense, Cleveland, Ohio.

Major Towne presented a brief resumé of the program which water utilities should now have under way to insure adequacy of supply, no matter what emergency conditions may arise. Shortage of materials has provided a more serious need for such a program than has the possibility of enemy action. He urged that special attention be given to the following points:

1. Organize to use available equipment with maximum efficiency. Have complete records of plans and parts of your system.

2. Locate emergency auxiliary water supplies for future needs. Provide emergency chlorinating facilities but do not cross-connect until necessary.

3. Water supply problems must be handled in cooperation with the State Civilian Defense Council, but its personnel should include water works men. Obsolete or excess inventory equipment should be handled through the State Water Coordinator as a clearing house. In West Virginia this office is held by T. J. Blair, Jr., West Virginia Water Service Company, Charleston.

Trustee
Kenneth Waldeck
Supt., Potomac Lt.
& Power Co.
Shepherdstown

Trustee
Paul D. Simmons
Chemist, Weirton
Improvement Co.
Weirton

4. Train water works personnel. The State of Indiana, for example, has developed an "in service" train-

ing program. Such a program should be closely tied in with local defense council activities and water works men should insist on emergency supervision of their own field.

"Current Status of Priorities," by E. J. McClees, District Manager, War Production Board, Charleston, W. Va.

Despite the rich reserves of raw materials and the tremendous production capacity available in this country, Mr. McClees pointed out the impossibility of building everything needed for the war effort—even with limitations on those items produced for non-war purposes. We now must choose those things which are most seriously needed. To properly control purchases and inventory, it is necessary for water works men to maintain complete and accurate records. The proper rating must be applied and allowances must not be exceeded.

It is recognized that water supply constitutes a most important utility, but the WPB must be given proof of need for everything asked for and requests should not be made for those things not absolutely needed.

"Scrap Collections at Water Works," by James M. Wolfe, Salvage Director for Wayne County. (Mr. Wolfe was drafted to serve for Burnam T. Mitchell, Conservation Division, WPB, Charleston, who was slated for this discussion but was unable to attend.)

Utilities are to be especially congratulated on their cooperation in scrap collections, but it is not recommended that materials which can still be used should be disposed of as scrap. Mr. Wolfe explained that industries have contributed 80 per cent of the scrap collected in West Virginia and individuals 20 per cent; only about 25 per cent of the total has proven suitable for production of steel, and there is still a serious need for scrap.

"The American Water Works Association's Interest in Mutual Aid, Priorities, and Salvage," by Harry E. Jordan, Secretary, American Water Works Association, New York, N. Y.

Mr. Jordan pointed out that water works have generally operated with safe reserves in normal times and that this procedure is highly commendable; but we are now at war and, in the interest of national defense, inventories must be bled down by restrictions. Our early plans for mutual aid were of academic interest—in case of attack—instead of imperative necessity in order to meet the requirements of WPB order P-46.

A.W.W.A. Director-Elect
T. L. Young
Mgr., South Side Water Works Co., Chester

New Trustee
D. V. Moses
Chemical Engr. du Pont & Co. Charleston

An A. W. W. A. survey of data from 200 large cities has provided an inventory basis on the 1940 level. It indicates the pattern which governs those plants supplying almost one-half the population of this country. On the average there existed a 60-day supply of chemicals, a 45-day supply of fuel, an 11-month supply of material for distribution system maintenance, and a 5-month supply of other materials. These inventories increased over the 1940 levels by 117 per cent in the first quarter of 1941, and by 125 per cent in the second quarter of 1941. Thus, until all possible material has been exchanged (over an estimated period of six to nine months) under P-46 requirements, the need for mutual aid will be very concrete.

Salvage should be considered nothing but good housekeeping; it is bad for any plant to have a warehouse full of useless material. But salvage must also be weighed against the mutual aid program. An old pump, for example, may be only scrap for the plant which owns it but may be exactly what is needed for emergency use at another plant. Mr. Jordan advised careful study of the A. W. W. A. memorandum, which restates the new WPB P-46 order. Ways have not yet been provided for buying and selling materials under mutual aid, and application to the WPB appears to be the most helpful procedure.

S. E. Linderman
Engineer, U. S. Pipe & Fdy. Co.
Philadelphia, Pa.

L. E. Jones
Dept. Mech. Eng.
W. Va. University
Morgantown

Material Maintenance Subject of Symposium

Five practical papers were presented under the subject, **"Extending the Useful Life of Water Works Materials."**

Each paper under this topic was given by a specialist in the particular field and was sensibly short on theory but long on practice. It is regrettable that space limitations permit only brief mention of this group of papers.

(1) "Repairs to Concrete Structures," by Lee Davis, Representative, Portland Cement Association, Charleston, W. Va.

Essentially, Mr. Davis said that good concrete does not need repairs. The preparation and placing of concrete is important, and most important is the proper ratio of water to cement during mixing. The Portland Cement Association is glad to provide valuable educational material which explains the fundamental principles and specifications.

(2) "Emergency Repairs to Cast Iron Pipe," by S. E. Linderman, Engineer, U. S. Pipe and Foundry Co., Philadelphia, Pa.

Even in emergencies, Mr. Linderman pointed out, permanent repairs can be made. Extensive experience in Great Britain has demonstrated the superiority of these repairs over temporary ones, and has demonstrated that repeated practice results in great reductions in time required. The value of mechanical joints, long sleeves, and of wooden plugs for repairs was described. Tests at Milwaukee have indicated that valves can best be closed 90 per cent complete rapidly, but that the last 10 per cent of closing should be done very slowly.

(3) "Maintenance of Electric Motors," by E. C. Jones, Department of Electrical Engineering, West Virginia University, Morgantown.

Regular inspection of motors—even those used only occasionally—and especially those in damp locations; checking of alignment; lubrication of bearings; cleaning and tightening of electrical connections; cleaning of bearings and oiling; all these important points were described by Mr. Jones. A general overhaul of all motors at intervals of five years or so is advisable, with removal of dirt, grease, and subsequent varnishing for protection as the important treatment.

(4) "Welding as a Maintenance Tool for Water Works Equipment," by L. E. Jones, Department of Mechanical Engineering, West Virginia University, Morgantown.

Welding operations have three principal uses: joining, cutting, and metallizing. Fusion welding methods were described as producing joints in cast iron and steel which can be machined. Brazing may be carried out at lower temperatures than welding—is used largely on copper and brass—but it should not be selected when higher heat will later be utilized. First cost of electric arc equipment is higher than first cost of oxyacetylene outfits, but electric arc operating costs are lower. Metallizing, the spraying of molten metal on previously prepared surfaces to restore them to size, is a modern development which has many useful applications.

(5) "Maintenance of Water Meters," by John Devine, Chief Meter Man, Parkersburg Water Works, Parkersburg.

According to Mr. Devine, the regular testing of meters is a profitable procedure: 1,500 class A meters were tested in Parkersburg in 1934 and, of these, 150 showed such errors in registration as to more than pay all costs of testing. Now over 1,900 meters are tested yearly. A full history of every meter is maintained by recording causes for changing the meter, test results, and costs. The procedures used were fully described.

Round Table Discussion of Break-Point Chlorination

Good evidence of the success of a water treatment method can be obtained from the man who uses it. That the "break-point" method of superchlorination successfully accomplishes a variety of purposes in West Virginia municipalities was made clearly evident in a round table discussion of this subject. The group of experts consisted of:

P. D. Simmons (presiding), Chemist, Weirton Improvement Co., Weirton.

D. H. Clark, West Virginia Water Service Co., Welch.

E. E. Chandler, Beckley Water Co., Beckley.

J. R. West, Weston State Hospital, Weston.

Eugene Brown, West Virginia Water Service Co., Weston.

A. R. Todd, Wheeling Water Co., Wheeling.

H. K. Gidley, State Health Dept., Charleston.

Arthur R. Todd
Supt. Filtration
Water Dept.
Wheeling

Harry K. Gidley
Asso. Engineer
State Dept. Health
Charleston

QUESTION: "Why did you adopt break-point chlorination?"

Mr. Clark: Our source of raw water, the Tug River, is heavily polluted with domestic sewage and coal washings. Changing from ground water to this supply caused consumer complaints. The water has its break-point at a 3.5 ppm. chlorine dose, but we feed 7.5 ppm.

Mr. Chandler: Three months after starting our filtration plant, taste and color conditions (due to vegetation and iron in our new impounding reservoir) made this treatment necessary. Our break-point has been attained when a chlorine residual of 2.0 ppm. is maintained ahead of the sedimentation basins. Tastes are eliminated at this point.

Mr. West: We had tastes and odors in our raw water; they are not present after break-point chlorination.

Mr. Brown: Algae, phenols, and mill wastes create odors. Laboratory tests indicated a break-point at a chlorine dose of 2.5 ppm. but we use 5.0 ppm. in plant operation.

Mr. Todd: Phenols, naphthalene, and other coke plant wastes are our chief sources of odor. We feed chlorine until the taste and odor disappear—without reference to the break-point. Usually a chlorine dose of 87 pounds per million gallons is required.

QUESTION: "Where is your point of application and what is the contact time?"

Mr. Clark: Chlorine is applied after the alum and lime in the mixing basin. A residual remains after the water passes through the settling basins (48-hour detention) and through the filters.

Mr. Chandler: Chlorine has 20 minutes' contact in the mixing basin and, when 2.0 ppm. residual enters the settling basins, we have exceeded the break-point.

Mr. West: We apply chlorine in the suction line of the low lift pump, feeding a dose of 3.0 ppm. A residual of 2.0 ppm. is present after a one-hour detention period, and a residual remains in the filter effluent.

Mr. Brown: Chlorine is applied before a 20-minute mixing period and, after a 2-hour settling period, a residual of 4.0 ppm. is present in the filter influent. A residual of 1.5 to 2.0 ppm. appears in the filter effluent. Ammonia (0.25 ppm.) is added ahead of the chlorine, when tastes are high, to give a better break-point; none is added when tastes are low.

Mr. Todd: Chlorine must be added before other chemicals (lime and coagulants), at least in waters containing coke wastes.

Mr. Simmons: Our application is the same as used by Mr. Todd: chlorine has 20 minutes' contact time in the raw water which is acid; then ferrous sulfate and lime are added. Our chlorine dose averages 19.8 ppm. but varies from 11 to 35 ppm. The residual drops through the sedimentation basins, but after filtration the residual remains constant.

QUESTION: "What are the advantages of break-point chlorination, in addition to taste and odor control?"

Mr. Simmons: It has eliminated mudballs and lengthened filter runs. The finished water has a zero bacterial count and no gas formers.

Mr. Todd: Our filters are cleaner and the treatment process is more economical.

Mr. Gidley: It has enabled Welch to use a surface water supply which would have been unacceptable without break-point chlorination.

Otto De Hart is Dead

For 30 Years P.D.M.'s Southwestern Manager.

The Late
Otto D. De Hart

Otto D. De Hart, Southwestern District Manager for Pittsburgh-Des Moines Steel Co., passed away at his Dallas, Texas, home on January 17th, at the age of 59.

Mr. De Hart, a 1905 civil engineering graduate of Iowa State University, was a member of the honorary fraternity Sigma Xi. He had made many friends for himself and his Company during the 30 years in which he has represented the Pittsburgh-Des Moines Steel Co. as its Southwestern Manager in charge of the Dallas office.

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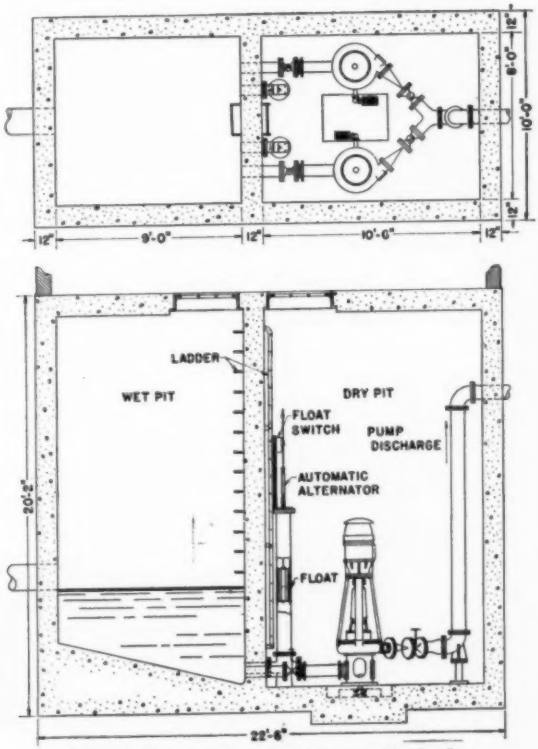
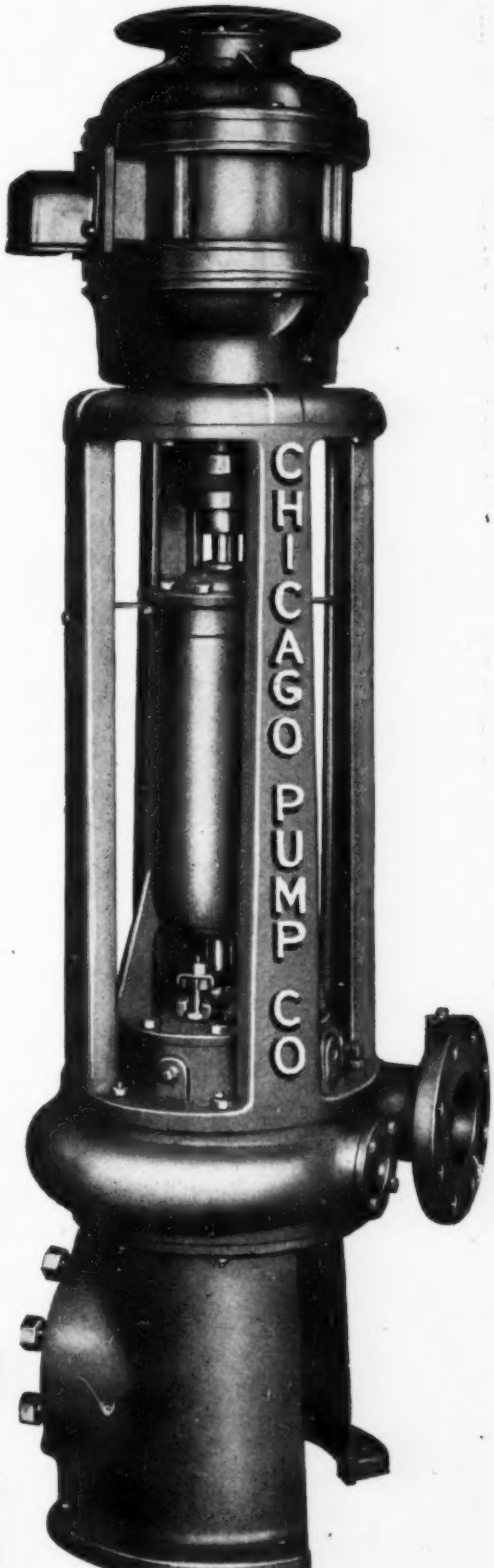


Layout of a sewage lift station with duplex Vertical Sewage Pumps. Bulletin 126.



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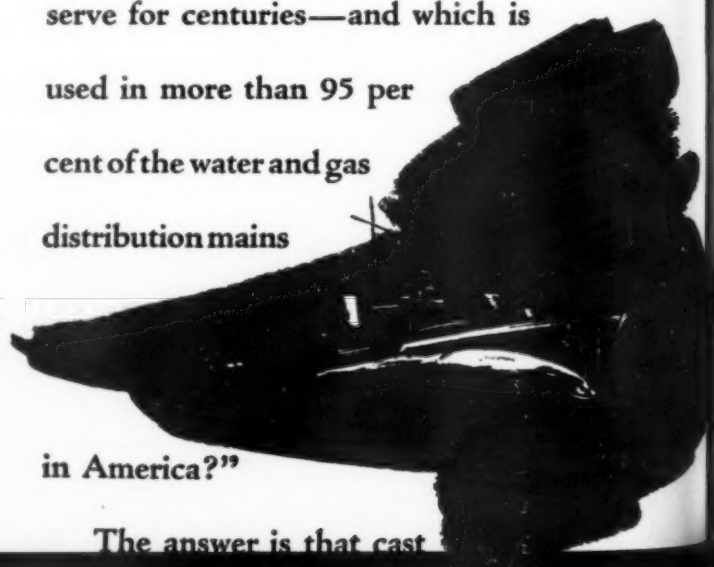
EXCEPT for those who have bought and installed cast iron pipe recently, in connection with a war project or war industry, few pipe users have laid the improved pipe now being made by our members—cast iron pipe that is not only *better* than ever but more *economical* than ever.

You may ask—"How can there be room for a major improvement in a product which is almost universally accepted as the standard—which is known to serve for centuries—and which is used in more than 95 per cent of the water and gas distribution mains in America?"



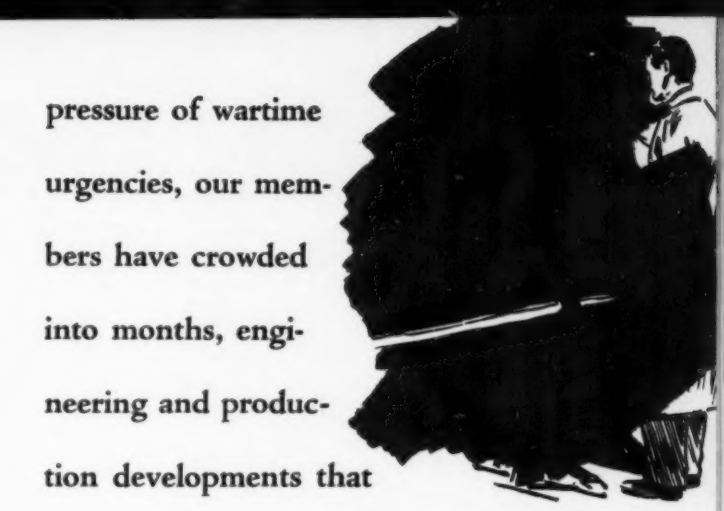
The answer is that cast

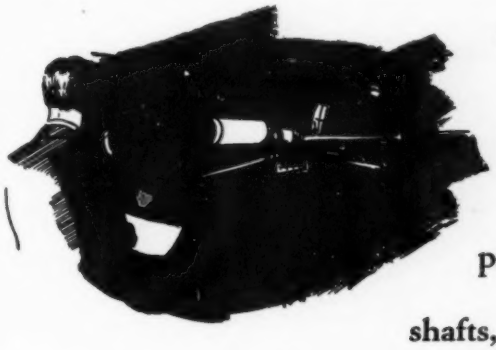
iron pipe is now *specifically designed for specific laying conditions*—and is made in accordance with the recently adopted A. S. A. Law of Design for cast iron pipe in underground service. An answer that has been worked out by consultants who *specify* pipe, by engineers who

install pipe, and by the metallurgists and production experts of our members who *make* pipe. Far from an overnight achievement, it is the result of ten years of cooperative study and scientific research under the auspices of the American Standards Association.

The advantages are obvious. No more under-guessing or over-guessing as to weights and thicknesses required. No longer need you specify, for *all* conditions, pipe that is designed for *worst* conditions. The potential aggregate saving in extra metal, and resultant economies for the utilities using cast iron pipe will be considerable.

But the cast iron pipe you buy today, as priorities and allocation of raw materials permit, is still further improved. Under the pressure of wartime urgencies, our members have crowded into months, engineering and production developments that might otherwise have taken years. Improvements in test technique and in laboratory controls from raw materials to finished product. Improvements in facilities made necessary by the wide range of war materiel we are producing or machining in our foundries and machine





shops—guns, shells, tank and plane parts, propeller shafts, machine tool parts—to mention a few.

So when you get cast iron pipe for civilian uses it will be better than ever—scientifically designed for specific laying conditions—pipe that you will say was worth waiting for. Cast Iron Pipe Research Association, Thomas F. Wolfe, Engineer, Peoples Gas Building, Chicago, Ill.

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RESEARCH ASSOCIATION, CHICAGO
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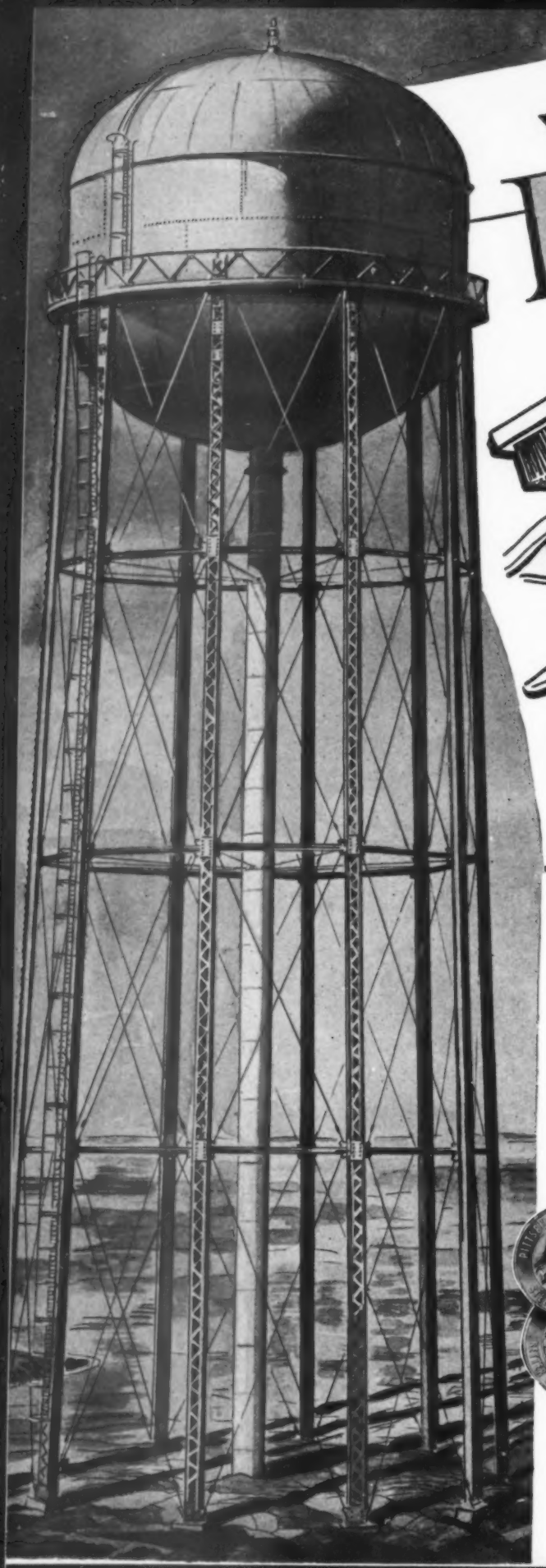

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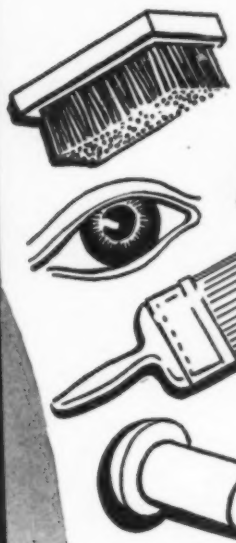

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PROGRESS IN WATER SUPPLY PREPAREDNESS IN NORTH CAROLINA

A Review of Plans, Procedure and Accomplishment

By WARREN H. BOOKER
Director of the Sanitary Engineering Division
N. C. STATE DEPARTMENT OF HEALTH
RALEIGH, N. C.
(State Water Coordinator)

THE more adequate protection of North Carolina's public water supplies as a civilian defense measure began to make progress on Monday morning, December 8, 1941, following Pearl Harbor on the seventh. A general letter was written to the five State Board of Health District Sanitary Engineers, on December 8, in regard to taking immediate steps looking toward the better protection of our North Carolina public water supplies to withstand any emergency which might arise.

In looking back, it is interesting to note the great number of points stressed in that preliminary letter which are still being stressed. Some of these points are: increasing the chlorine residual; returning chlorine cylinders promptly; discouraging visitors at water works and filtration plants; taking every reasonable precaution against sabotage; stocking moderate supplies of chemicals and cast-iron pipe and fittings for possible emergency repairs; repairing all equipment, as far as possible, and laying in a reasonable supply of spare repair parts; providing fences, floodlights and guards for extremely vulnerable or strategic features; providing new fire hose, with adapters where necessary; providing maps and plans of valves and fire hydrants; studying each water works for its own special vulnerable points, and providing means of protection of these vulnerable points, as far as possible.

The letter ended with the admonition: "Let's follow this through and not get caught napping. Even if nothing untoward ever happens, the practice of keeping a great lot of these odds and ends gathered up will be very beneficial to us, to the water works authorities and to the public health interests of the state." This admonition with reference to water works is as true now as it was then. Another comforting thought in connection with water works preparedness work, which is probably also true to a very large extent with many other fields of civilian defense activity, is that 95 per cent or more of the work done is equally valuable during peacetime. Practically all of it should have been done before. Nothing is lost.

The Author

The report of noteworthy progress and attainments in the North Carolina program of water supply preparedness is deserving of emphasis. The work and accomplishments of the State Water Coordinator and his co-workers is deserving of high praise. Mr. Booker presented this report before the N. C. Section of A.W.W.A., at which time his state-wide Inventory of Surplus water works materials was distributed.

This impressive resumé is being printed with permission of the Association.

On December 10, 1941, another letter was sent out to the district sanitary engineers, based on a telegram from the U. S. Public Health Service, urging vigilance against sabotage, exclusion of visitors from water works, providing guards at danger points, and stepping up the chlorine dosage.

On December 17, 1941, a general letter was sent to all mayors, boards of aldermen and water works authorities, urging action in many matters of general preparedness of water works to meet any emergency.

Mutual Aid Plan Started

There followed vigorous efforts on the part of district sanitary engineers to secure compliance with the suggestions made. Conferences were held with prominent water works men and with officials of the North Carolina Section of the A. W. W. A., and in January, 1942, steps were taken to get a Mutual Aid Plan under way in North Carolina similar to those being undertaken in New York and Massachusetts. The public response to this Mutual Aid Plan was most gratifying. By the latter part of January, 1942, Mutual Aid inventories from water works, large and small, were pouring in to the Division of Sanitary Engineering of the State Board of Health in large numbers.

Despite automobile tire and gas problems, it was decided, with the cooperation of Dr. H. G. Baity of Chapel Hill and several foresighted water works men, to call a statewide meeting of water works and municipal officials at the Institute of Government of the University of North Carolina (Chapel Hill) for a one-day session on Jan. 28. To this meeting were also invited key men from adjoining states.

The attention and attendance at the meeting were beyond all expectations; in fact, the attendance was so large that it was necessary to transfer the sessions to larger quarters. Principal features on the program, presided over by T. S. Johnson, at that time State Director of Civilian Defense, included discussions of bombing, sabotage, civilian defense, mutual aid and other wartime problems, by leading authorities in the various fields.

Since that meeting, the author has been appointed State Water Coordinator, and he, together with other State Board of Health engineers, has pushed the Mutual Aid program vigorously.

A 10-Point Preparedness Program Set Up

Later a "Ten-Point Preparedness Program" was inaugurated and promoted in connection with personal visits by district sanitary engineers to municipal water works, wherever time and opportunity from routine

duties permitted. Under this program are included, briefly, the following items:

1. Securing a Mutual Aid Plan inventory of water works men, materials and equipment available for emergency service.

2. Selling or exchanging excessive reserves, such as pipes, fittings, pumps, motors and other equipment.

3. Increasing water works auxiliaries by connection to other municipal water supplies, to safe industrial supplies, to safe private supplies; by providing other auxiliary sources of raw water; by arranging to use nonpotable water for fire protection only, should the emergency require; and by providing sources of auxiliary power for pumping and operating water works equipment.

4. Locating, testing and making usable all gate valves and fire hydrants.

5. Getting plot plans of the water distribution and the sewer collecting systems.

6. Forming emergency organizations and integrating them with the Office of Civilian Defense and emergency training of auxiliary water repair crews.

7. Keeping in a high state of repair, maintenance and efficiency all water works equipment; such as pumps, motors, chlorinators and filtering and other mechanical equipment.

8. Studying the matter of personnel, including close checks of loyalty and trustworthiness, nationality and the likelihood of sabotage of water works by present or former disgruntled employees and others.

9. Taking miscellaneous precautions; such as fencing, floodlighting, guarding, locking of doors and gates to water works property, exclusion of visitors, blackout precautions, increased chlorine residual and better police vigilance.

10. Studying carefully and confidentially the vulnerable points, such as remote dams and reservoirs, exposed pipelines, transformer stations, intake structures and unprotected or open reservoirs; and, finally, enumerating recommendations with reference to all points, except the vulnerable points, which are considered confidential and which are discussed only in person with water works and municipal officials.

After going over this program with the officials in charge, formal reports were made and filed with municipal and water works officials. As the result of this effort, 80 of the most strategic and important towns have been canvassed, formal reports prepared, and much excellent work has been done toward placing these water works on a better defense basis. It is planned to visit and report on approximately 30 more public water supplies in the near future. Valves have been located, repaired and spotted on maps. Maps of distribution systems have been prepared, revised and brought up to date. A reasonable supply of reserves for repair in emergencies has been stocked by a great many water works and, in general, the water works in North Carolina are now far better prepared to withstand an emergency than they have ever been before.

Surplus Inventory Survey

As critical materials problems increased, the War Production Board began curtailing purchases. In July, a meeting of representatives of the North Carolina Section of the A. W. W. A. convened and directed the State Coordinator to prepare a surplus materials inventory of all water works in the state serving populations of over 5,000. This was done, with the result that a master inventory, showing approximately 500 tons of pipes, specials and other surplus equipment in these towns, is now available. So great was the interest manifested by smaller water works, it was decided to extend the inventory to include all water works in the state. A compilation of this second master inventory was completed as of October 30, 1942.* In it are listed approximately a thousand tons of pipe and fittings; a great many motors and pumps; lead, copper and brass tubing; valves, hydrants, and much other available surplus water works materials. It is expected that water works of the state will, to a large extent, have to live on this "fat" for the duration. For this reason every effort is being made to conserve the material for use within water works circles, and to use as small an amount of it as possible, with the thought in mind that it may be more and more difficult to get materials of this kind from factories and foundries at a later date.

North Carolina water works have come a long way during the first twelve months of war. As far as can be learned, it is believed that they are far ahead of the water works of any other southern state and well abreast of those of New York, Massachusetts and other states in danger zones.

The next step which has been considered, and which it is hoped to undertake shortly, is the matter of training water works emergency repair crews at various strategic points throughout the state.

As indicated in the first general letter under date of December 8, 1941, "even if nothing untoward ever happens, this practice of keeping a great lot of loose odds and ends gathered up will be very beneficial to us, to the water works authorities, and to the public health interests of the state." It is just good business and good common sense to be prepared. The more of these civilian defense measures taken, the better water works will be prepared, not only for war emergencies, but for any peacetime emergencies. It follows, then, that there will be less likelihood of interruption to the regular business routine of providing an abundant supply of clean, safe, wholesome water for drinking and domestic purposes, as well as for fire protection, throughout the public water supplies of North Carolina.

Appreciation is expressed for the splendid cooperation to the water works of the state, for the advice and assistance of the officers of the North Carolina Section of the A. W. W. A., and more especially for the interest, assistance and encouragement of the State Director of Civilian Defense, Ben E. Douglas.

*Copies of this voluminous inventory were distributed to those attending the N. C. Section Conference only three days after its completion.—Ed.

Tar Coatings Not Forbidden on Pressure Pipe

(A Correction)

In the annual review of "Developments of 1942 in Water Supply" under the heading Limitation Orders of WPB, it was stated that "A September amendment to Order L-42 forbade the further use of tar coatings on cast-iron pipe to save over a half million gallons of tar. In this direction San Francisco has developed the use of a thin coat of bituminous enamel applied without primer."

From a reader, now connected with the Water Production Section of WPB, who is in a position to know, we have been informed that the amendment to Order L-42 applied to but one grade of cast-iron pipe—namely, to cast-iron soil pipe alone. Tar coatings for pressure types of cast-iron pipe have not been forbidden.

This correction does not in any way alter the second part of the paragraph, which refers to San Francisco's development of a thin bituminous enamel coating which is applied without benefit of primer ahead of the enamel.

VIRGINIA SECTION'S NINTH ANNUAL CONFERENCE

As Reported by Former Long-Time Secretary of the Virginia Section

H. W. SNIDOW
Prin. Asst. Engr.
VA. STATE DEPT. OF HEALTH
RICHMOND, VA.

Chairmen

Roland J. Leveque, Ass't Gen. Mgr., Phipps & Bird, Inc., Richmond, Va. (Retiring)

Chas. L. Crockett, Chief Chemist, Nor. & West. Ry., Roanoke, Va. (Incoming)

AS WOULD seem appropriate for the times, the program of the Ninth Annual Conference of the Virginia Section, A. W. W. A., centered around subjects concerned with the relation of public water supplies to the National Defense and the National War Effort. The Conference, held in Richmond, Va., November 5 and 6, was attended by close to 200 members and guests.

The opening session on Thursday, November 5, comprised a "Symposium on Coordination of Public Water Supplies with the Office of Civilian Defense." **Major Gordon E. McCallum,** Assistant Chief Sanitary Engineer, Office of Civilian Defense, Washington, D. C., explained the purposes of his organization and, particularly, the desire to cooperate fully with the authorities in charge of water supplies. Maj. McCallum stressed the fact that water is one of the most critical of war materials and that any failures in supplying adequate water, particularly in defense areas, must necessarily materially affect National Defense. Therefore, those in charge of the maintenance and operation of water supplies were urged to keep in close coordination with their respective Councils of Defense and to keep themselves in a state of alert readiness to meet such demands as occur.

Col. J. H. Wyse, Coordinator, Virginia State Council of Defense, Richmond, Va., reiterated the importance of water as a vital defense material—a fact fully realized by our enemies. As examples he cited the fates of Warsaw, Hongkong and Singapore, in each of which the water supply was singled out for destruction. It was explained that the Virginia Defense Council, as originally set up by Governor Price, forwarded memoranda to all of the utilities in the state outlining plans and urging the immediate adoption of measures to protect against possible sabotage. Later, the law enacted under Governor Darden for defense legislation made it mandatory that each of the subdivisions within the state create and maintain a local Council of Civilian Defense responsible for local protection.

Wolman on Vital Problems

Doctor Abel Wolman, President, American Water Works Association, and consultant to W. P. B., gave a brief analysis of the vital problems, with respect to personnel and materials, which confront our country under the present war emergency. Concerning personnel, he advised that the studies have indicated that we need a considerable additional population from which to draw man-power and trained services for defense activities. It was advised that a portion of the deficiency could possibly be made up by the training and employment of more women in technical positions, particularly sanitary engineering. As an example, he mentioned the appreciable number of licensed women professional engineers found carrying on sanitary engineering work in one of our allied South American countries which he had recently visited. Doctor Wolman further explained that an additional portion of the personnel deficiency might be made up by diverting some of our more advanced high school students to short courses of intensive training for civilian defense and utility positions.

Honored

E. F. Dugger, Gen. Manager, Water Dept., Newport News, Va.

New Vice Chm'n

J.C.Hanes, Lt.Col. Assoc. Prof., C. E., V. M. I., Lexington, Va.

AWWA Directors

R. C. Bardwell, Supt., Water Sup., C. & O. Ry., Richmond, Va. (Incumbent)

Richard Messer, Chief Engineer, State Dept. Health, Richmond, Va. (Director-Elect)

With reference to materials, it was explained that our chief deficiencies comprise iron, manganese, zinc, copper and aluminum and that it is extremely urgent that these materials be conserved in every way possible for the manufacture of necessary war materials. Concerning continued granting of these materials for utility uses, Doctor Wolman warned that those making application except in cases of absolute need would probably be advised "politely but firmly" that they could not have them. He also advised that those having undue quantities of supplies made of these materials stored in local "stock piles" would doubtless be required "politely but firmly" to turn them in for the manufacture of war materials. Although it was acknowledged that small requests or retentions of small extra quantities of these materials might possibly appear as "little matters" to those in charge, Doctor Wolman impressed upon his audience that all should bear in mind that our United States is now engaged in the "little mat-

ter" of carrying on in the most extensive war in all history.

Conditions in the Hampton Roads Area

The conditions with reference to the Hampton Roads Area, which has been so materially affected by the National Defense measures, were described **By Col. Charles B. Boreland,** City Manager and Director of Civilian Defense, Norfolk, Va., and **Mr. E. F. Dugger**, Past President, A. W. W. A., and General Manager, Water Commission, Newport News, Va. For Norfolk Col. Boreland explained that, whereas the 1940 population of the city had been approximately 145,000, with a water demand of about 12 m.g.d., the population now is in excess of 200,000 and the water demand, for normal and defense activities, is about 25 million gallons per day. Col. Boreland further advised that, in instances such as Norfolk, where the demand on the water supply had been so materially increased, entirely due to National Defense needs, he felt that the National Government should assume large responsibility for the maintenance and operation of such supplies. He further advised that the city had carried out the recommendations for flood-lighting and guarding of the vulnerable areas

Guests and Old-Timer

Left: O.C.D.'s Regional Engineer, Geo. E. McCallum (Major), U.S.P.H.S., Washington; Center: WPB's Water Section Chief, Arthur E. Gorman, Washington; Right: Norfolk's Long-Time "Super," E. H. (Ned) Herbert (Elected Trustee of the Section).

and stations, together with the other precautions, and that they would continue to carry on to the full extent of their resources.

For Newport News, Mr. Dugger called attention to the Hampton Roads Area as one of the most important in our Eastern defense. He advised of increases in populations in the areas on the north side of Hampton Roads equal to or in excess of those described by Col. Boreland. As an example, he cited the increase in personnel at the local ship building plant from approximately 6,000 in 1939 to 34,000 in 1942. It was advised that the recommended precautions to protect against possible sabotage had also been carried out and that, in addition, they had constructed barricades for the protection of vital water pumping and storage stations. Instead of the usual sand bag embankments, it was explained that the barricades had been constructed of cinder blocks with the spaces filled with wet sand and extended to a height sufficient to protect against bomb splinters. Mr. Dugger advised that very little

Secretary and Treasurer

Frank H. Miller, Asst. Engineer, E. C. Meredith, Asst. Engineer, Virginia State Dept. of Health, Richmond, Va.

could be done to protect against direct hits in the event of an actual attack; but he felt that, for protection against bomb splinters, barricades made of cinder blocks, as described, are a distinct improvement over the sand bag construction ordinarily used. He further advised of the additional measures which had been provided to protect their main water reservoir, which is impounded by an earth dam without core; also protection afforded by the installation of duplicate pipe lines and valves. The particular need and advantages of the extra protection was explained by the fact that the auxiliary supplies, with the exception of Harwood's Mill, discharge into the main storage reservoir which thus provides 22 million gallons of the daily quantity made available for the portion of the Hampton Roads area furnished by Newport News.

The conditions in two of the principal inland cities, not so much affected by increases in population incident to defense activities, were described by **Mr. J. P. Millikin,** Chief Chemist, Roanoke City Water Department, and **Mr. Marsden C. Smith**, Chief Engineer, Department of Public Utilities, Richmond, Va. Mr. Millikin, speaking for Mr. Charles E. Moore, Manager of the Roanoke Water Department, explained that they had considered protection of the water supply from possible sabotage as of chief importance. To this end they had carried out the recommendations for flood-lighting and guarding, particularly at the large spring and main pumping station which furnishes the principal portion of the supply. Mr. Millikin also mentioned their consideration of possible poisoning as a potential risk, particularly with reference to their storage reservoir supply, and advised that such examinations as could be used to detect possible poisoning were being made by his laboratory.

Concerning Richmond, Mr. Smith enlarged some on the previously mentioned conceptions of risks, stating that his department considered such as two-fold risks due to (1) possible efforts by individual crack-pots and (2) risks from organized saboteurs. He explained that it was considered possible to prevent damage by the first class but that, in his opinion, the water works authorities are practically helpless to prevent planned destruction by the second class. Mr. Smith further explained their full adoption of the recommended precautions and their practice of not allowing anyone to enter on water works premises except satisfactorily identified and accompanied by an operator guard. In order to provide for taking care of damage, if caused, he stated that the city had set up five emergency service stations and had enrolled 322 trained volunteer helpers to man these stations and cooperate with the City Fire Department in cases of emergency, particularly fire. Mr. Smith also explained that his department had made a careful check of all the valves and hydrants in the distribution system, to insure proper working condition; and had further arranged so that, in the event of a break in any particular section of the city, other sections could and would be cut off, with notice, in order to supply available

Richmond Hosts

Left: J. R. A. Hobson, Jr., Director of Utilities, Richmond; Center: Marsden C. Smith (Chairman, AWWA's Water Purification Division), Chief Engineer, Water, Gas and Electricity; Right: J. H. Henderlite, Supt of Filtration

water to the section most in need for fire fighting or otherwise.

Dugger Receives Fuller Award

The Conference Dinner on Thursday evening, November 5, was at-

tended by a full representation of members and guests. The program consisted of the usual acknowledgment of guests and, particularly, the presentation of the George W. Fuller Award. This was followed by the scheduled movie, "Advantages of Attending A. W. W. A. Meetings," presented by Mr. W. A. Welch, Industrial Chemical Division, West Virginia Pulp and Paper Company. The movie was much enjoyed and many complimentary expressions were given Mr. Welch for his interesting presentation and the encouragement of attendance at the A. W. W. A. meetings. The George W. Fuller Award was voted to Mr. Eugene F. Dugger of Newport News, and was accepted by him with a very appropriate acknowledgment.

The citation with the award read:

"In recognition of his inspiring leadership, not only in the work of the Virginia Section, but also as President of the American Water Works Association (1938); and for his efficient and meritorious handling of the difficult water supply situation in the Northern Hampton Roads area during this critical war period, as well as his representation of the Association before Congressicnal Committees to assist in providing Federal funds for the assistance of communities whose public service facilities were rendered inadequate by defense and war activities, and for his pioneering in the establishment of methods of government procedure whereby other sections of the country, as well, have been enabled to obtain Federal assistance more readily in solving their water supply problems."

Priorities and Substitute Materials

On Friday morning, November 6, the program again centered around a very pertinent field, **"A Symposium on Priorities and Substitute Materials."**

Mr. Arthur E. Gorman, Chief of the Water Production Section, Power Division, War Production Board, again reminded water works men of the extreme importance of water as a defense material and cited the large quantities required by certain plants manufacturing defense products. It was mentioned that the need is most vital in certain defense centers, of which Norfolk and Newport News in Virginia were given as examples. With reference to priorities, the recent developments and changes were explained, particularly the revision of P-46 on October 10. It was advised that materials for maintenance and repairs would now carry an AA-5 priority and that, in the case of a breakdown emergency, the priority may be extended to AA-2-X by the local water utility. The requirement for inventories of water works materials now applying to cities having populations of 50,000 or more was also explained; particularly the order under which 40 per cent is considered as a surplus which may be made interchangeable under the direction of a materials coordinator. Mr. Gorman further advised that the plan of the War Production Board now contemplates the requirement of inventories from all places having populations of 5,000 or over, and that forms are now being prepared for submitting these inventories in duplicate to Federal and State authorities. With respect to water supplies, it was pointed out that, should the war be prolonged and should there be deficiencies in rainfall, we may possibly be faced with water shortages. In order to anticipate this, it was explained that for next summer the W. P. B. plans a campaign for water conservation. Utilities, including water, were advised to plan for a long war and to use every precaution to keep equipment in satisfactory working condition.

"Priority Effects on Large Installations" as experienced during the recent construction of the extensive water works improvements in the Hampton Roads Area was related by **Mr. Reeves Newsom,** Consulting Engineer. Mr. Newsom first discounted any popular conception that the cities of Norfolk and Newport News, represented by him, may have been granted any higher priorities than elsewhere under similar conditions. Instead, he described the successive changes and additions in priorities which they had found it necessary to secure and, particularly, the different classes for the various types of materials required. It was explained that the initial project for Newport News—the 4 m.g.d. Harwood Mill Filter Plant together with pumping station and 10-mile, 24-inch connecting pipe line—was originally begun under the provisions of the Lanham Act; and that a priority of A-3 for materials was obtained in about three weeks, under which, by rapid ordering, a large part of the needed materials was secured. However, as the work progressed and the additional projects, including

Programmers

(1) *Reeves Newsom, Consulting Engr., Newsom & Aldrich, New York City*

(2) *R. C. Clement, Division Mgr., Wallace & Tiernan Co., Newark, N. J.*

(3) *L. C. Bird, President, Phipps & Bird, Inc., Richmond, Va.*

(4) *Fred E. Stuart, President, Stuart-Brumley Corp., Baltimore, Md.*

(5) *Wilbur W. Winfree, Asst. Mgr. Sales, Glamorgan Pipe & Fdy. Co., Lynchburg, Va.*

(1) *J. W. Fleet, Distict Mgr. (Brooklyn, N. Y.) and Geo. H. Gleeson, Manager Meter Div., Pittsburg-National Meters (Pittsburgh)*

(2) *Fred Dimmick, Div. Mgr., R. D. Wood Co. (Richm'd) - Stuart R. Royer, Con. Egr., Richmond and Ralph L. Kelly, Div. Mgr., Hydraulic Dev. Corp., N. Y. C.*

(3) *Chas. R. Spencer, Manager of Sales, and Ray W. Odor, Sales Engineer, Lynchburg Foundry Co., Lynchburg, Va.*

(4) *Earl R. Smith, Asst. Supt. of Water, and Wm. G. Myers, City Engr. & Water Supt., Harrisonburg, Va.*

(5) *Phil Kavanagh, District Engr., (Roanoke) and H. B. Snyder, Jr., Service Engineer, Wallace & Tiernan Co. (Richmond)*

the 31-mile, 34-inch Chickahominy raw water pipe line for Newport News and the 20-mile, 42-inch pipe line for Norfolk, were undertaken, it was found that the need for rapid completion necessitated filing successively for additional and higher priorities.

"The Cast Iron Pipe Situation" was reviewed by **Mr. Wilbur Winfree,** Engineer, Glamorgan Pipe and Foundry Co., Lynchburg, Va., who implied that it is rather difficult for any one to portray what the situation is right now and, as a simple answer, referred to an interesting statement recently made by another speaker on a similar program—"Don't try to buy anything, because you can't get it." However, he explained that, in the beginning, the essential primary material, pig iron, was allocated to the pipe manufacturers on a basis of plant productiveness; but, in October, the allocations had been cut ten per cent. He explained that originally pipe was obtained with blanket priorities under P-46 and that the Army and Navy orders were filled under AA-3 and AA-2, respectively. The question now, as yet not clearly answered, is: How much raw material (pig iron) will be allowed for the manufacture of supplies for municipal needs?

"The Meter Situation" was recounted by **Mr. M. J. Siebert,** Neptune Meter Co., Richmond, Va., who humorously implied that he felt that the meter representatives, such as himself, were now more on the receiving end than on the giving end for information concerning the present status of water metering. As an illustration, he mentioned that, as a result of his attention to advices just previously given in discussion by Mr. Gorman and others, he had found it necessary to make several changes in the text for his remarks. However, Mr. Siebert brought out very clearly that water meters are considered essential, particularly in certain sections, for the conservation of the very important defense material—water. He advised that the need for meters may be more urgent in certain portions of any distribution system than in others and, in line with this fact, mentioned that a number of places had already adopted the policy of removing meters from sections where the records showed minimum consumptions of water and using these meters for replacements in sections where more urgently needed.

In the previous discussion it had been stated by Mr. Gorman that, while appealing to the people to save as much as possible without meters, W.P.B. is giving attention to materials for meters and that the restrictions on metering will likely be lessened.

"The Situation in Water Works Laboratory Supplies" was explained by **Mr. L. C. Bird,** President, Phipps and Bird, Inc., Richmond, Va., who explained that the authorities in Washington had shown that they wished to make laboratory supplies available, even though restricted to the most necessary uses. Therefore, W. P. B. had put into effect the limitation order L-144 to provide for such equipment to be obtained by the Army and Navy for research and that needed in the training of personnel for defense duties. It was also explained that, under the existing provisions, public health, water and sewage laboratories now in use may come in to the extent of securing items necessary for the replacement of needed equipment. However, new establishments must make special application to W. P. B. Mr. Bird further explained that laboratory supplies include about 20,000 items of which, fortunately, about 98 per cent may be secured through rather simple procedure. But, concerning the other two per cent, he advised that it would be best not even to talk about it. Certain materials, when plentiful, may possibly be secured without priority. However, it was advised that priorities would facilitate orders and that, in each instance, it is necessary that the end use be specified.

"Concerning the Alum Situation," Mr. Fred E. Stuart, President, Stuart & Brumley Corp., Baltimore, Md., pointed out that for materials made from our limited supplies of bauxite, water works is unfortunately in competition with one of the most necessary of war machines—the aeroplane. Consequently, it has been necessary for water works to find and adjust itself to means of using alum made from grades of bauxite which are inferior to the grade which is required for the production of aluminum for aeroplanes. Therefore, the new "Victory Alum," instead of having the former 17 to 18 per cent quality, has a considerably less percentage of available alumina, producing an alum of about 9 to 12 per cent strength. This product is less soluble and consequently leaves more residue. However, Mr. Stuart explained that the operators of water works have fast developed additional means of dissolving and applying the new alum so as to obtain reasonably satisfactory results. With reference to the smaller water plants having limited storage facilities, Mr. Stuart further explained that one of the principal problems is transportation under the present requirement for full car loadings in bulk shipments. Even the smaller railroad cars have a capacity of 80,000 pounds (40 tons), which is considerably more than the average small plant has been accustomed to securing in any one order. It was also mentioned that this problem may be further complicated by the fact that, due to existing conditions, it may not be possible to secure transportation of smaller quantities by truck.

Chas. A. Johnson, Supt. of Water, Salem, Va. | *S. L. Williamson, City Engr., Charlottesville, Va.* | *N. D. Kenny, Cons. Engineer, Baltimore, Md.* | *Burt Graham, Stuart-Brumley Co., Baltimore* | *R. Stuart Royer, Cons. Engr., Richmond, Va.* | *R. D. Wright, Supt. of Water, Lynchburg, Va.* | *E. H. Aldrich, Newsom & Aldrich, Williamsburg, Va.*

Emergency Main Sterilization

"Emergency Sterilization of Water Mains" was covered by **Mr. R. C. Clement,** Division Manager, Wallace and Tiernan, Newark, N. J.,

"Mike" Siebert, Neptune Meters, Richmond, Va. | *Wm. H. Lang, Chemist, Newport News, Va.* | *Ernest H. Mays, Supt., San. Dist., Madison Hgts., Va.* | *"Bob" Fitzgerald, Supt. Filtration, Norfolk, Va.* | *Otis W. Brown, Supt. Filtration, Salem, Va.* | *X. D. Murden, Supt. of Water, Portsmouth, Va.* | *"Bill" Cambridge, Hersey Meters, New York, N. Y.*

who explained that the necessities of the present war had brought about the development of a portable chlorinator capable of applying the quantities of chlorine needed for sterilizing mains against customary back pressures. It was also pointed out that corrosion (tuberculation) makes sterilization more difficult, and if mains are cleaned prior to attempts at disinfection, much more positive results may be obtained. For determining chlorine residuals during and following treatment, Mr. Clement recommended and explained the "drop method" of using orthodolidine with the customary comparator registering from 0.1 to 1 p.p.m. and suggested the following procedure: Ordinarily place 1 ml. of orthotolidine with 14 ml. distilled water (making 15 ml.) in the comparator cell used for observing the color reaction, then add one drop of the chlorinated water. If a color appears, multiply the strength indicated by the dilution factor of 300 to obtain the chlorine residual in the water being tested. If a color does not appear on the first trial, add and try successively with two, three, and up to four drops of the chlorinated water, in each instance multiplying by the correspondingly reduced dilution factors of 150, 100 or 75. Mr. Clement further cautioned that, in every instance, the amount of orthotolidine used should be in excess of that required for the strength of chlorine expected, otherwise the test would only register for the amount of orthotolidine used and the true chlorine residual of the water would not be obtained.

R. C. Bardwell, in discussion, stated his opinion that the use of caustic and caustic water is the answer to the problem. He pointed out that lime and caustic soda are easy to obtain and that an application of 50 grains per gallon will penetrate jute.

Question Box—

Following the scheduled papers, the meeting was brought to a close with a short "Question Box Session" presided over by **Mr. Richard Messer,** Director, Sanitary Engineering, Virginia State Department of Health. In answer to a question by Mr. Sharp of Richmond as to what other water works men were doing reference substitutes for copper pipe, all of those called upon indicated that they either still had some small quantities in stock or had galvanized pipe which they were using.

Mr. Bardwell asked concerning what priority is necessary to obtain stability protection for steel tanks. Mr. Shiddell of The Electro Rust-Proofing Co. advised that cathodic protection has the approval of W. P. B. and is recommended by the Government. He further stated that a priority of AA-5 is used and is still sufficient to obtain the necessary equipment.

Mr. Messer himself introduced the question as to what color should now be used for painting the exteriors of water tanks and the materials required. The answers implied that the coatings should be of a dark soft dull quality which would not reflect moonlight; however, that specific recommendations should be obtained from the Government. Col. Hanes advised that such information could be secured.

"Kaydets"

[Prof. Hanes' squad from the South's West Point—the Va. Military Inst. at Lexington. These young men are C. E. students specializing in water supply and sewerage.]

From left: W. R. Moore, W. L. Stagg, L. D. Freeman, A. C. Taylor, I. C. Riggin, Jr., son of Virginia's health commissioner, Dr. I. C. Riggin, who also attended the conference.

New Officers

The report of the Nominating Committee was unanimously adopted, naming the following officers for the coming year.

Chairman

C. L. Crockett, Chemist, N. & W. Ry. Co., Roanoke, Va.

Vice-Chairman

Lt. Col. J. C. Hanes, Assoc. Prof. CE, V. M. I., Lexington, Va.

A. W. W. A. Director

Richard Messer, Director, San. Eng., State Dept. Health, Richmond.

Trustees

E. H. Herbert, Supt., Water Dept., Norfolk.

Roland J. Leveque, Phipps & Bird, Inc., Richmond.

Secretary

Frank H. Miller, State Health Dept., Richmond.

Treasurer

E. C. Meredith, State Health Dept., Richmond.

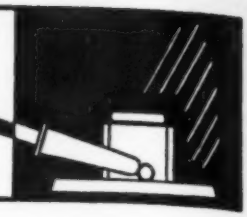
The 1944 Annual Conference is to be held in Roanoke, Va.

W. W. Gutteridge Made Spring Valley Sup't

Wesley W. Gutteridge of Hackensack, N. J., has been appointed superintendent of the Spring Valley Water Works and Supply Co., succeeding the late Courtland M. Mosier, according to a recent announcement by Charles J. Alfke, executive vice president. The Spring Valley Co., which serves the communities from Grand View and Piermont to Spring Valley in Rockland County, N. Y., is a subsidiary of the Hackensack Water Co.

Mr. Gutteridge has been a member of the engineering staff of the Hackensack Water Co. since 1937, and for the past four years has served as assistant hydraulic engineer. He entered the field of water supply engineering and operation in 1921, when he joined the staff of Nicholas S. Hill, Jr., who was president of the Hackensack Water Co. from 1926 until his death in 1936.

The Editor's Comments



The Axe Has Fallen

SINCE the beginning of priorities, rationing and allocation of materials and supplies we have felt ourselves most fortunate in not having been faced with the necessity of more than an insignificant lowering in the quality or quantity of Gillette publications. The only change necessitated has been to use a paper less highly chlorine bleached and reduced as to degree of sizing and finish. Except possibly the somewhat less clear cut reproductions from illustrating halftones these less satisfactory qualities of the wartime paper stock would ordinarily be undetected. On one occasion, because of a delayed delivery of the 60 pound stock customarily used, we had to go to press with the thinner 50 pound paper in November—a transportation difficulty.

However, even with the added wartime requirement of having the contents of 1942 issues passed by the Office of War Censorship, we have felt that in comparison with the war problems of others ours were of extremely minor nature. We even boasted about our good fortune in being able to give our readers a magazine in 1942 of even larger size than in earlier years.

Today we have a different story since having come face to face with W.P.B.'s 1943 axe. Yes, W.P.B.'s "worry bird," which has thus far so pleasingly flown over, has now perched himself squarely in the middle of our desk. From W.P.B. he brought the unpleasant tidings that publishers were to be required in 1943 to reduce the quantity of paper used—that even the more essential of the technical magazines must be reduced in size by 10 per cent immediately—and this hit us squarely. In referring to size, since only the poundage of paper stock used is the criterion, it makes no difference to the W.P.B. how the reduction is made—i.e., fewer pages per issue; the same number of pages on thinner stock; a reduction in the trim size (width and height) of the magazine; or, a reduction in copies printed.

Our problem was what to do first and what might be done later if matters worsen in the direction of an additional cut later in the year. After considering the several possibilities we decided against "rationing" of circulation for the present at least. (A warning, however, is—If you value your subscription to any magazine, don't let it lapse in these days.) We will continue to accept new and increased advertising schedules as long as a fair balance between articles and advertisements can be had. We decided to maintain as far as possible *the same quality* of product as in 1942. That is, as long as permissible we will continue to print on the same quality 60 pound stock and run as many pages as can be gotten in under the 10 per cent reduction requirement.

After some calculating we found that all but about 2 per cent of the 10 per cent reduction could be realized by trimming the size of the magazine to that of this first "reduction issue"—i.e., to 11¼x8⅛ inches. We have gone to a lighter weight stock for the cover and advertising inserts. The printed page is being maintained at the same 7x10 inch size and therefore there will be no reduction in number of words per page.

This, we believe, is the best solution of the present problem. If further reduction becomes necessary, it will have to be by some of the other means mentioned. Readers can help by writing us which of such means they would prefer.

An Impressive Meaningful Picture

Accompanying the report covering "A.W.W.A. Board Actions," elsewhere in this issue, is an impressive picture in the form of a graph revealing the 10 year membership growth in the American Water Works Association. Year by year a sustained increase has been shown until now, standing at 4,441 members, A.W.W.A. has more than doubled in size during the past nine years—a very real reflection of the value of leadership of those A.W.W.A. executives responsible for an association of growing productivity and increasing benefits to its members.

Of equal interest to that spectacular graphic record is the sawtooth pattern of the growth curve. Those valleys in the curve at year ends (representing for the most part members dropped for non-payment of dues) reveal that fewer and fewer have been dropping out in recent years. Of more significance, however, is the realization that with the increasing membership numbers the *per cent* losses in members has become materially lower, even though the actual members per year had *not* diminished one bit. Such a percentage in "renewals" (as publishers term these continuing memberships or subscribers) is evidence of the quality of the A.W.W.A. Journal, as well as the regard for other values received by members, including the wonderful production job which Secretary Jordan has done and continues to do.

Hidden in this graph are figures representing growth of Corporate Memberships, wherein the municipality takes out and maintains membership for its own benefit and its water works staff's benefit alike. Actual counts show a year to year increase in Corporate Memberships, which also have practically doubled since 1934. However, we feel that the maintaining of Corporate Memberships by benefiting municipalities has not come up to what it should by a long measure.

It seems apparent that Warren W. Booker, who rated the new A.W.W.A. award as its No. 1 member getter in 1942, must have felt the same way about this question. His score reveals that he persuaded an impressive number of municipalities that the taking out of Corporate Membership is not only good business but also constitutes a show of appreciation for values received from those A.W.W.A. activities which benefit every water works, whether in or out of the Association.

Mr. Booker, who had nothing to sell but SERVICE to his North Carolina municipalities, has produced a worthy pattern which other "ace" member getters in A.W.W.A. should not lose sight of. In short, can any reader name a greater value that a municipality can buy for $15.00 a year?

MEETINGS SCHEDULED:

Mar. 12-13—MINNEAPOLIS, MINN. (Nicollet Hotel).
Minnesota Section, A.W.W.A., Sec'y-Treas., R. M. Finch, 416 Flour Exchange, Minneapolis, Minn.

Mar. 18—BOSTON, MASS. (Hotel Statler).
New England Water Works Association. (Monthly meeting.) Secretary, F. J. Gifford, 613 Statler Bldg., Boston, Mass.

Mar. 25-26—TRENTON, N. J. (Stacy-Trent Hotel).
New Jersey Sewage Works Association. Secretary, John R. Downes, Plainfield, N. J.

Mar. 25-26—SYRACUSE, N. Y. (Hotel Syracuse).
New York Section, A.W.W.A. (Spring War Conference.) Sec'y-Treas., Rollo K. Blanchard, 50 West 50th St., New York, N. Y.

Apr. 7-9—HAMILTON, ONTARIO. (Royal Connaught Hotel).
Canadian Section, A.W.W.A. Sec'y A. E. Berry, Ontario Department of Health, Parliament Bldgs., Toronto, Ont.

April 19-20—LITTLE ROCK, ARK. (Marion Hotel).
Arkansas Water and Sewage Conference (Annual Conference). Secretary, Harrison Hale, 114 Chemistry Bldg., Fayetteville, Ark.

May 7-8—BELLINGHAM, WASH. (Hotel to be selected).
Pacific Northwest Section, A.W.W.A. Secretary, Fred Merryfield, Engineering Laboratories, Oregon State College, Corvallis, Ore.

June 8—HARRISBURG, PA. (Hotel Penn-Harris).
Pennsylvania Water Works Operators' Association (Annual Meeting). Sec'y-Treas., I. M. Glace, 22 S. 22nd St., Harrisburg, Pa.

June 9—HARRISBURG, PA. (Hotel Penn-Harris).
Pennsylvania Sewage Works Association (Annual Meeting). Sec'y, Bernard S. Bush, State Dept. Health, Harrisburg, Pa.

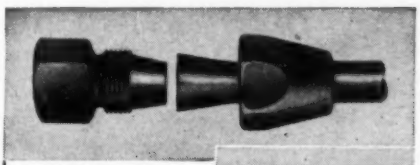
June 16-18—CLEVELAND, O. (Statler & Carter Hotels).
The 1943 A.W.W.A. Conference on WAR WINNING Water Works Operations. Executive Secretary, Harry E. Jordan, 22 East 40th Street, New York, N. Y.

Sept. 16-17—DENVER, COLO. (Hotel to be selected).
Rocky Mountain Section, A.W.W.A. Secretary, O. J. Ripple, Supt. Filtration, Littleton, Colo.

Oct. 11-13—(Place not selected.)
Sonthwest Section, A.W.W.A. Secretary, Geo. J. Rohan, Supt., Water Works Municipal Bldg., Waco, Texas.

Oct. 21-23—CHICAGO, ILL. (Hotel to be selected).
Federation of Sewage Works Associations. Annual Meeting, "War Time Conference." Secretary, H. W. Wisely, Urbana-Champaign Sanitary District, Urbana, Ill.

Have They "GOT YOU DOWN"?



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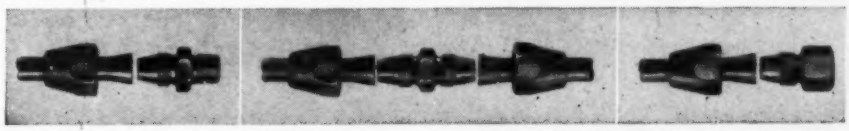

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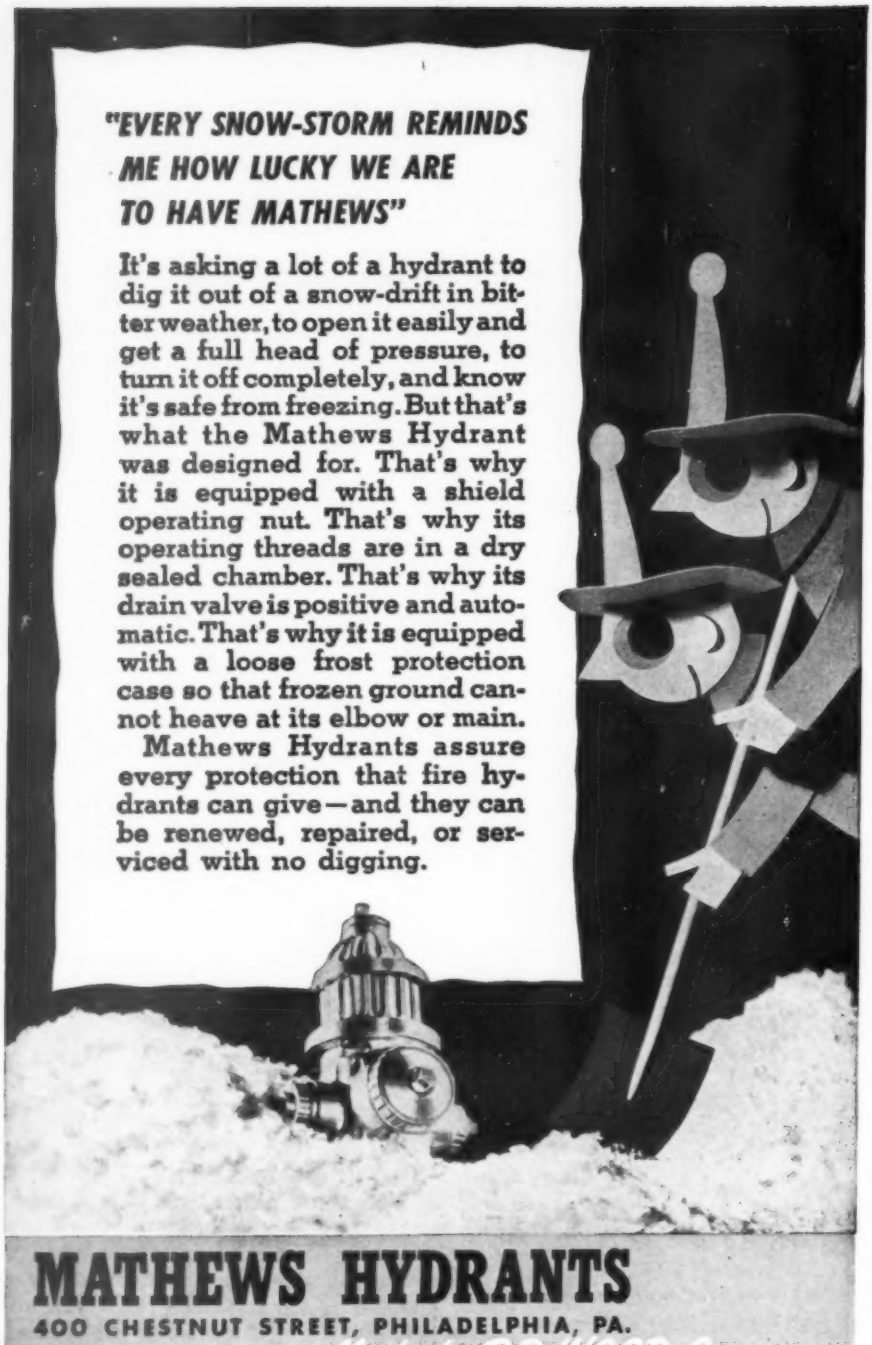

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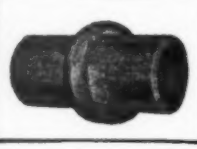

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L. A. WESTON Adams, Mass.

Chlorine Institute Holds Annual Meeting

The Chlorine Institute, Inc., held its Annual Meeting and Directors' Meetings at the Chemists' Club, New York, N. Y., on Jan. 27th. The following directors were elected for two years:

Thomas Coyle, E. I. duPont deNemours & Co.; W. I. Galliher, Pittsburgh Plate Glass Co.; L. Neuberg, Westvaco Chlorine Products Corp.; E. E. Routh, Mathieson Alkali Works, Inc.; B. P. Steele, Pennsylvania Salt Mfg. Co.; Eli Winkler, Southern Alkali Corp.

The hold-over directors are:

G. S. Cooper, Diamond Alkali Co.; R. W. Hooker, Hooker Electrochemical Co.; S. W. Jacobs, Niagara Alkali Co.; E. C. Speiden, Innis, Speiden & Co.; I. H. Taylor, Wyandotte Chemical Co.

At a Directors' Meeting following the Annual Meeting, the officers shown below were elected for the year 1943:

S. W. Jacobs, President; E. C. Speiden, Vice President; Robert T. Baldwin, Secretary and Treasurer.

L. H. Enslow continues as Sanitary Engineer for the Institute and H. A. Faber as Research Chemist.

At the Annual Meeting Luncheon, Major General William N. Porter, Chief, Chemical Warfare Service, and Harry E. Jordan were honored guests.

Ten Commandments for Sewage Plant Operators

I Thou shalt be conscientious in thy work and do thy utmost to protect the stream below thy plant.

II Thou shalt not commit "by-passage" unless unavoidable.

III Thou shalt use thy head in emergencies.

IV Thou shalt operate thy plant as if thou lived in the closest house.

V Thou shalt keep complete, usable operating records.

VI Thou shalt endeavor to increase thy knowledge of sewage treatment at all times.

VII Thou shalt help thy brother operator in distress.

VIII Thou shalt be economical in the proper operation of thy plant, as if thine own money was being spent.

IX Thou shalt keep thy plant neat and attractive in appearance.

X Thou shalt take pride in thy plant and make the people of thy town proud of it as well.

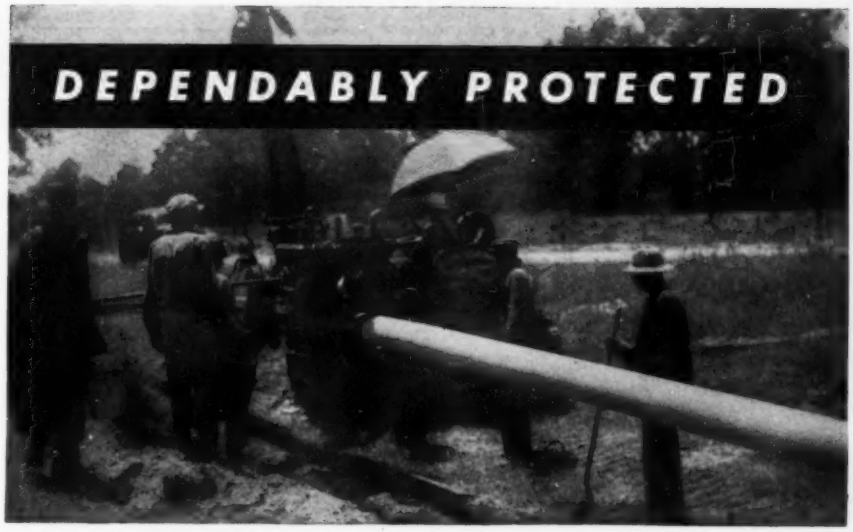
(Illinois State Dept. of Health.)

THE DIGESTER.

LITERATURE AND CATALOGS

"Role of Bacteria in Corrosion" is the title of an article by Dr. Arba H. Thomas, Chief Research Chemist, American Rolling Mills Co., reprinted in pamphlet form, together with an editorial by L. H. Enslow, Editor of WATER WORKS AND SEWERAGE, and distributed by the Wallace and Tiernan Company, Inc. In discussing the subject of internal corrosion of water pipes, and the production of "red and black water" Dr. Thomas presents the results of laboratory experiments showing pronounced cases of biologically aggravated corrosion. Examples of corrosion in pipe installations that have been examined and found to contain bacteria of either the sulphate splitters or the iron-consumers type are also discussed. Dr. Thomas' paper and the discussion thereof do not definitely prove that the bacteria themselves are the direct cause of corrosion but it is apparent that either or both types of bacteria mentioned play a role in the corrosion, perhaps as hydrogen acceptors in the corrosion reaction or as the producers of a localized pH capable of inducing rapid corrosion. Regardless of the theory of the corrosive action, the important factor developed was that where bacteria play a part in corrosion and the production of red water, the adverse condition may be prevented by the use of chlorine or ammonia-chlorine with the maintenance of a residual in the distribution systems. Both Dr. Thomas and one of the discussors of the paper, Mr. Griffin of The Wallace and Tiernan Co., presented information on field observations in several localities in the United States wherein the use of chlorine was efficacious in preventing bacterial growth, red water, black water, and biological tuberculation. For a copy of Dr. Thomas' informative article, write to The Wallace and Tiernan Company, Inc., Newark, N. J., for a reprint.

Water Screens for the efficient removal of solids from water are illustrated in Book No. 1852 of the Link-Belt Company. Diagrams of different types of installations are shown, together with illustrations of typical installations of these travelling water screens. These mechanisms consist of substantial frames on which head and foot sprockets are mounted to engage chains between which overlapping screen



WITH *Reilly* PIPE ENAMEL

OIL, gas and water lines coated with REILLY PIPE ENAMEL are dependably protected under all conditions of soil and climate. REILLY ENAMEL bonds firmly to the metal, providing a smooth, hard coating that effectually resists abrasion and soil stress, withstands extremes of temperature without sagging in intense heat or cracking in sub-zero cold, and prevents corrosion caused by moisture, electrolysis, soil acids or alkalis. On the inside of water lines, the smooth, mirror-like REILLY lining prevents incrustations and tuberculation, and assures full-capacity flow for the life of the pipe . . . REILLY Coal Tar Paints give lasting and economical protection to tanks, stacks, structural steel and all metal surfaces exposed to the atmosphere, corrosive gases or vapors . . . Booklet describing these REILLY protective coatings will be sent on request.

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A Filter Medium For All Purposes

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STATE COLLEGE, PA.

EDSON DIAPHRAGM PUMPS

Hand Sizes 2", 2½", 3", 4"
Power Sizes 3" and 4"
Open Discharge or Force Pump
Edson Special Suction Hose
Red Seal Diaphragms
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Hose Spanners—Adapters

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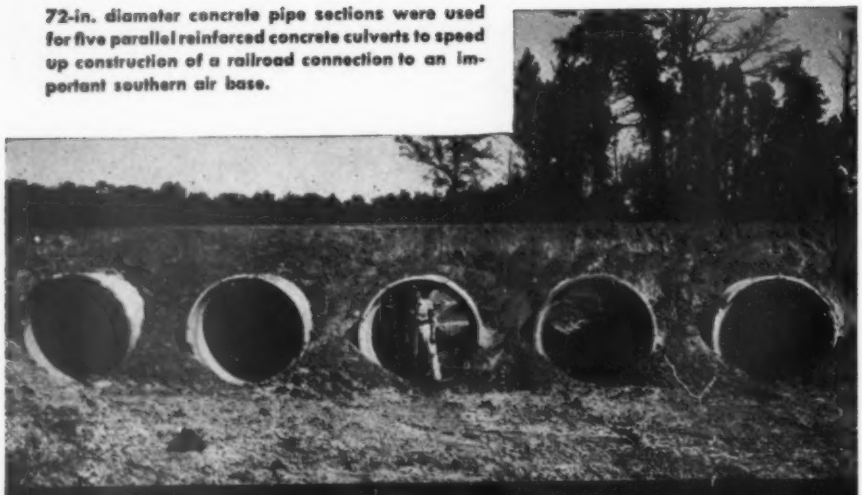
New York: 142 Ashland Pl., Brooklyn

72-in. diameter concrete pipe sections were used for five parallel reinforced concrete culverts to speed up construction of a railroad connection to an important southern air base.



CONCRETE PIPE
widely available for vital war projects

Concrete pipe in many instances has helped speed up water, sewerage or drainage projects urgently required in important defense areas.

Concrete pipe combines the qualities of long life, maximum hydraulic capacity, great strength and low annual cost. Evidence of these qualities is found in thousands of concrete pipe installations under highways, railways and major airports as well as in municipal service.

And concrete pipe conserves critical materials. Established concrete pipe manufacturers are ready to serve you in nearly every community.

Technical assistance is available to engineers and builders engaged in important wartime projects involving concrete pipe or any concrete construction.

PORTLAND CEMENT ASSOCIATION
Dept. A2-29, 33 W. Grand Ave., Chicago, Ill.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

BUY MORE WAR SAVINGS BONDS

INCINERATION ENGINEERS
NICHOLS ENGINEERING & RESEARCH CORPORATION
60 WALL TOWER NEW YORK, N. Y.
Consultants • Designers • Constructors

trays are assembled—all driven by a reducer, roller chain drive and motor. As water passes through the screen (wire cloth) the solids remain on the cloth and tray lips and are dislodged by a stream of jetted water as they pass non-clogging spray nozzles. The solids and spray water are sluiced away for disposal. Front spray types are ideal for use where the refuse is light and small (leaves, moss, small fish) and quantities not excessive. Back spray types are best suited where refuse is long, stringy, heavy or bulky. Features that mean more effective screening include the screen trays that provide a maximum area of wire cloth, special driving equipment, and positive sealing against passage of solids between the ascending trays. Included in the folder is an information sheet which may be mailed to the company for further advice on installations desired. A copy of the Book 1852 may be obtained at any sales office of the Link-Belt Company or at 307 N. Michigan Ave., Chicago, Ill.

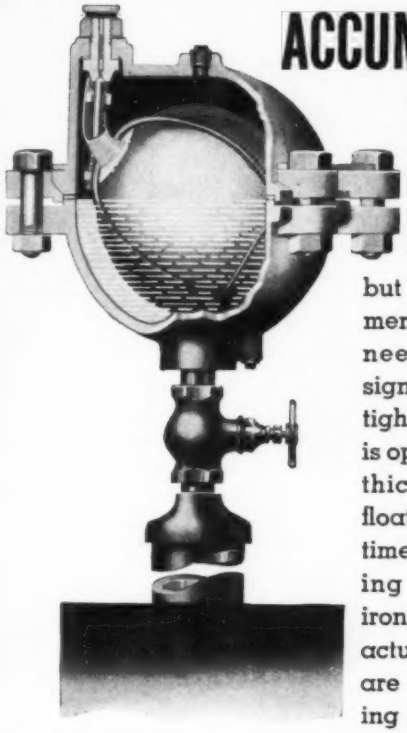
How to Paint a Concrete Floor is the title of a Bitumastic Bulletin No. 21, 1943, recently published by the Wailes Dove-Hermiston Corp., in which general instructions for the use of Florex Floor Enamel are given. Included in the instructions are the methods for cleaning concrete floors with a zinc sulphate solution, mixing and applying the primer, testing the floor for dampness, and applying the finish coat. Florex floor enamel stands up under repeated washings, and is water, oil, and grease-proof. The bulletin also describes the special Bitumastic treatment of an oil tanker S. S. Emidio, in 1922, the same tanker that was the first victim of an enemy submarine off the West Coast. Other long time protection by Bitumastic products is exemplified by the case of the Dalmuir Works of the Glasgow (Scotland) Sewage Disposal Plant. There, in 1904 the first treatment of hot Bitumastic Enamel was given the bottom, sides, and girders of steel sludge tanks. In 1910 these surfaces were again treated as were similar surfaces of other tanks and the interior of a sludge boat and a sewage catch pit. Recent examination of these surfaces showed the enamel to be in good condition. Bitumastic products have been used extensively in the United States to protect sewage plant surfaces. A typical application is at the Ward's Island Sewage

(*Continued from page* 68)

IS *AIR SABOTAGING* YOUR PIPE LINES AND PUMPS?

If not removed, air entrained in a liquid or entering the system through leaky joints and pump suctions, may result in serious damage to the pipe line and to the pumping equipment. These air obstructions not only reduce the operating head, but the area of discharge is considerably reduced or entirely cut off.

SIMPLEX AIR RELEASE VALVES AUTOMATICALLY VENT AIR ACCUMULATIONS



THE Simplex Automatic Air Release Valve is of simple, dependable construction, having but one lever movement which operates a needle valve so designed as to be always tight seating. The valve is operated by a heavy thickness glass ball float, tested to several times the service working pressure. A cast iron shell houses the actuating parts which are of corrosion resisting materials.

Standard Simplex Air Release Valve is for working pressures up to 250 lbs. per square inch. The Type "ARA" valve is similar in design but operates up to 1250 lbs. per square inch. Simplex Air Release Valves are being used extensively on lines and pumps for the release of air in water and sewage lines, oil and gasoline lines, and for industrial process liquids.

Write today for further information on the Simplex Air Release Valve — the automatic watchdog to assure continuous peak flow.

SIMPLEX VALVE & METER COMPANY

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CHLORINE

LIFE SAVER ON BATTLE FRONTS AND ON THE HOME FRONT TOO

Among the busiest of chemicals, Chlorine enters into the production of almost everything in the soldier's and sailor's equipment. It also helps produce motor fuel and synthetic rubber, anti-malarial and Sulfa drugs, magnesium metal for aircraft and preservatives for foods.

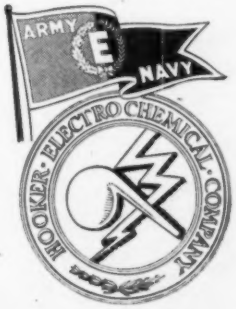
On the home front its uses are equally extensive. They range from dyes and textile finishing materials to drugs and anaesthetics. Indispensible for the sterilization of drinking water, sewage treatment and swimming pool disinfection,

HOOKER LIQUID CHLORINE

has long been known for its purity and uniformity.

Naturally, war uses have first call on the Nation's supply of Chlorine, but here at HOOKER we are keeping our many water works and sewerage customers very much in mind. We serve them to the full extent possible under Government regulations. After the war, HOOKER'S greatly expanded production facilities will insure prompt service from its plants at Tacoma, Washington and Niagara Falls, N. Y.

Other busy HOOKER Chemicals include Caustic Soda and Ferric Chloride Solution.



HOOKER CHEMICALS

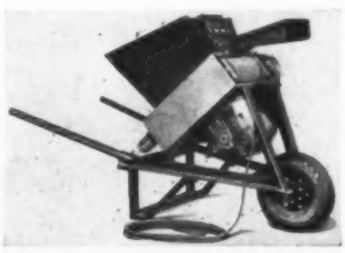
3662

We did it for the Army . . . . and now we can do it for you!

At Aberdeen Proving Ground in Maryland, they wanted a Royer "Jr." Sewage Disintegrator. It had to be self-powered, as it was for use at a point where electric current was not readily available. All previous Royers of this type were electrically operated, but the Army gets what it wants from Royer. Thus, Aberdeen Proving Ground has the Royer "Jr." shown above, powered by a small gasoline engine, in place of the usual electric motor driven model shown below.

The Royer "Jr.", powered either way, is now available—subect to priority—for all sewage disposal plants.

Like all the twelve models of Royers, it shreds sludge to pea-size particles, further dries and aerates it, removes sticks, stones and trash and loads it onto trucks or wheelbarrows in a condition where it can be readily marketed as a fertilizer. The cost of burial or incineration is eliminated. Instead, the sewage plant has a steady source of revenue; or the product can be used at local parks, golf courses, greenhouses, etc.



THE ROYER

Operators of the smaller sewage disposal plant will find it worthwhile to investigate the Royer "Jr." Write for full information.

ROYER FOUNDRY & MACHINE CO.
170 PRINGLE ST., KINGSTON, PA.

(*Continued from page* 66)

Plant in New York City. One feature of the bulletin is a quick reference guide for proper Bitumastic paint or coating for various corrosive conditions. These recommendations are made on the basis of corrosion problems submitted by Bulletin readers. For various surfaces and corrosive conditions thereof recommendations are made for normal conditions and severe corrosive conditions. Steel gratings in sewage plants and concrete water softening tanks are included in the list. This Bulletin No. 21, 1943 may be obtained from the Wailes Dove-Hermiston Corp., Westfield, N. J.

The "Permutit" Spiractor is described in a bulletin issued by the Permutit Company. This is a new cold lime-soda water softener that produces clear soft water instantly, at the same time saving space, costs, and handling. The Spiractor embodies a revolutionary new softening principle — *catalytic precipitation.* Besides hastening the softening process which takes less than five minutes, a charge of granules of catalyst serve as nuclei around which the precipitated compounds of calcium and magnesium build up. No voluminous wet sludge is formed but instead enlarged granules which may easily be disposed of. These granules may be crushed and reused as the catalyst bed of further water treatment. The Spiractor consists of a conical steel shell partially filled with a granular catalyst screened to the proper grain size. Raw water and the usual chemicals are introduced into the lower extremity of the cone through separate inlets. This is shown in a diagrammatic figure. The tangential direction of the inlets plus the conical shape of the shell imparts a turbulent spiral motion to the incoming water and chemicals; thus, intimate mixing of the water, chemicals, and granular catalyst is assured. As the water rises in the shell the velocity is gradually reduced through continuously increasing cross-sectional area. A point is reached where the velocity is no longer sufficient to suspend the catalyst and the design is such that when the water has reached this point the time of reaction has been sufficient for completed softening reactions. When the granules have become too large they may be removed from the bottom of the cone and fresh catalyst

(*Continued on page* 70)

Slow but sure. Processes and chemicals used in clarification of industrial liquors are entrenched by long established successful usage. Colloidal bentonite is so radically different that changing to its use is a gradual development. But its employment in many more clarification problems will be inevitable when its unique activities become better understood.

The main duty of a coagulant is to entrain impurities within its flocs. Colloidal bentonite does that, but in addition has properties not possessed by other coagulants. Absorption of certain organics, removal of color and reduction of odors are some of its characteristic functions.

And, it is effective over a wider pH range than others.

VOLCLAY

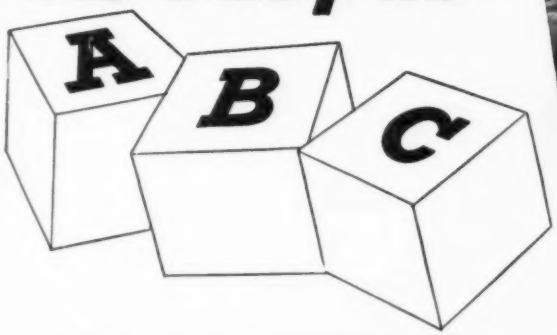
VOLCLAY is first among bentonites for floc-forming and absorption qualities. Produced in powder form and also as the well-known KWK VOLCLAY grade which can be dispersed in water much more conveniently than powder.

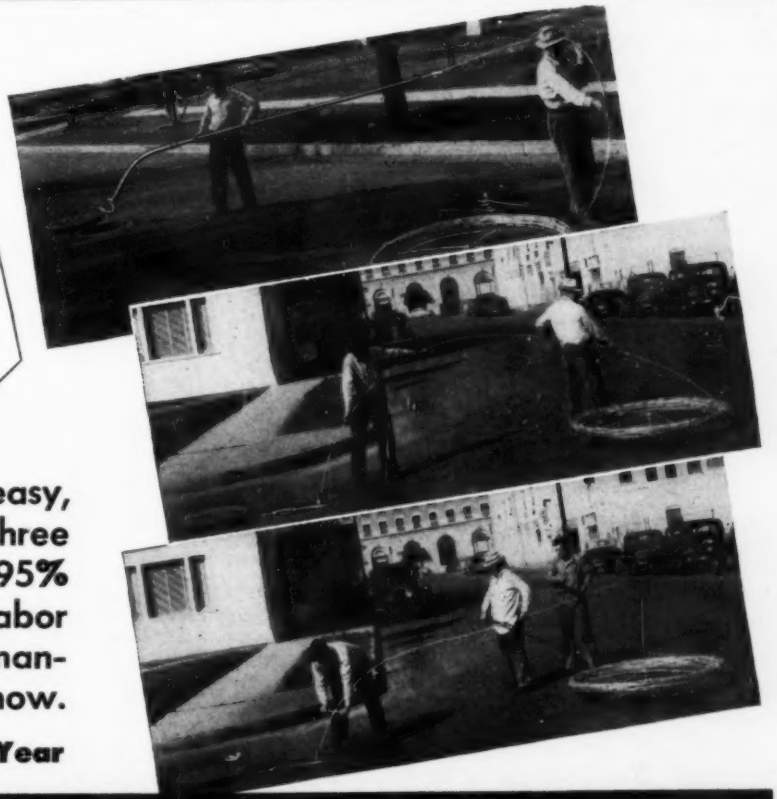
Write for samples and technical data

AMERICAN COLLOID COMPANY

363 WEST SUPERIOR STREET • CHICAGO, ILLINOIS

As easy as





Clean your sewers this fast, easy, economical, FLEXIBLE way. Only three simple steps needed. Eliminate 95% of sewer dig-ups. Save time, labor and inconvenience. Conserve manpower. Get a set of FLEXIBLES now.

Clean All Your Sewers Once Each Year

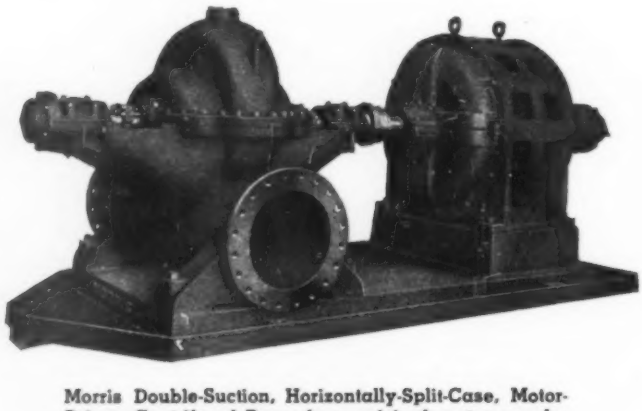
FLEXIBLE SEWER-ROD EQUIPMENT CO.

9059 VENICE BOULEVARD LOS ANGELES, CALIFORNIA

401 BROADWAY, NEW YORK, N. Y. • PICKWICK BLDG., KANSAS CITY, MO.

MORE WATER FOR THIRSTY CITIES

Is your present pumping equipment obsolete or insufficient? If so, Morris Water Supply Pumps will provide new standards of efficiency and dependability for your pumping plant. These units have made notable records in water supply pumping stations because of their many distinctive features of design that provide remarkably high efficiency and assure thoroughly dependable operation. Every water department superintendent should know about the most recent developments in Morris Pump design. Write for complete information.



Morris Double-Suction, Horizontally-Split-Case, Motor-Driven Centrifugal Pump for municipal water supply, with raised lip on bedplate. These units can also be furnished with two or more stages.

MORRIS MACHINE WORKS — MORRIS ESTABLISHED 1864 — BALDWINSVILLE NEW YORK

CENTRIFUGAL PUMPS

(*Continued from page* 68)

added at the top. Advantages include small size, flexibility, elimination of re-pumping, elimination of moving parts, no sludge handling, and relative portability. The bulletin gives operating results from three different types of water and three different desired results. By virtue of the design and operating characteristics, the system is well suited to certain municipal requirements, as well as for cooling water treatment, and for railroad locomotive boiler water. Engineers or industrial men who would care to discuss any of these applications in detail are urged to write the Permutit Company, 330 West 42nd Street, New York, N. Y.

Repair Clamps and Service Fittings, by Skinner, are presented in a comprehensive new catalog of 40 pages in an attractive binding and effectively indexed for easy use. In a glance through this new catalog the number of repair and service items supplied by the M. B. Skinner Co.—now for almost a half century in the business—is greater than ordinarily realized. Repair and leak stopping clamps for plain end and bell and spigot pipes are the featured items, the Split Coupling "Skinner-Seal" Clamp being perhaps the best known unit for repairing broken mains. Then there is the malleable iron split clamp for repairing splits, pit holes, corrosion leaks, and the extra long clamp for long splits. Also there are pipe joint leak clamps for screw jointed pipes.

In the section devoted to Service Fittings are found Service Saddles and Saddle Tees for making service connections and the Bull-Neck Strut Tee of malleable iron, for making service connections with a wide margin of permanence. Three pages are devoted to Skinner Drilling Devices, Cutters and Adaptors and various connections made with them.

By interesting sequence manipulation pictures, installation of the various clamps and service fittings is clearly illustrated for the catalog users' benefit. For a copy of the new Skinner-Seal Catalog No. 41 write The M. B. Skinner Co., South Bend, Ind.

The Dorrco-Hydro-Treator is a self contained water treatment unit described in a folder issued by the Dorr Company, Inc. This equipment

has three separate zones for three essential steps in water treatment—Flocculation, Thickening, and Clarification. The unit has been developed for the three most common problems of raw water treatment, softening, turbidity removal, and color removal. It is a highly flexible water treater readily adapted to most problems of water purification and the practices of chemical treatment, flocculation, clarification and sludge thickening. A general drawing of the unit shows it to consist of a round or square tank divided into three zones. Uppermost is the zone of clarification where the flocculated solids are separated from the water. Directly below is the intermediate zone of thickening where the solids are concentrated prior to discharge at a minimum water content. In the lower portion of the tank is the zone of flocculation where the incoming raw water is chemically dosed and mechanically conditioned to produce heavy flocs of solids. The mechanical conditioning is brought about by vertical paddle blades attached to rotating distributor arms and intermeshed with stationary blades to provide the gentle agitation that promotes the formation of heavy settleable flocs. The accumulation of flocs build up to a level slightly above the sludge cone wherein they are thickened. The released water passes upward and is clarified. The combination of these three steps into a single unit makes large plant performance available to small industrial plants and moderate sized communities. Where two stage treatment is desired, two of the Hydro-Treators may be used in series with carbonation between. The mechanism is of standard iron and steel construction and tanks may be of concrete or steel. Two types are available; for sizes up to 28 ft. in diameter, and for tanks from 30 to 100 ft. in diameter. Advantages listed include, ideal feeding, efficient flocculation, simple and inexpensive tanks, complete utilization of volume and area, maximum sludge density, removal of ultra-fines, and rapid clarification. Further information may be obtained from the Dorr Company, Inc., Engineers, 570 Lexington Ave., New York, N. Y.

Activated carbons are solving troublesome purification problems in a growing number of industries. And in each of these industries, you'll find Darco doing an outstanding job.

When you use Hydrodarco — the Darco carbon specially made for water treatment—you get the advantage of 20 years' experience in developing and making carbons for many types of purification. Result: maximum effectiveness in removing tastes and odors.

Join the alert waterworks men who have found that a small difference in price per pound may mean a large difference in odor-removal efficiency. We will be glad to send you complete details, along with a sample of Hydrodarco.

HYDRODARCO

Reg. U. S. Pat. Off.

DARCO

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STEWART SEWER CLEANING EQUIPMENT
MACHINES LEASED OR SOLD

WOODEN & STEEL SEWER RODS • STEEL TAPES

ROOT CUTTERS • SEWER CLEANING BUCKETS • CABLE

JUMBO NO. 10 HEAVY DUTY WOOD RODS

Made of Selected Hickory with strong Malleable Iron Couplings, in 2½, 3, 3½ and 4 ft. lengths. Triple Lock, impossible to buckle or uncouple in the sewer. The tongue and groove feature eliminates wear on hook, increasing the length of service.

FREE TRIAL — THE RODS MUST PAY FOR THEMSELVES

Write today for Complete Catalog

MANUFACTURING SEWER CLEANING EQUIPMENT SINCE 1901

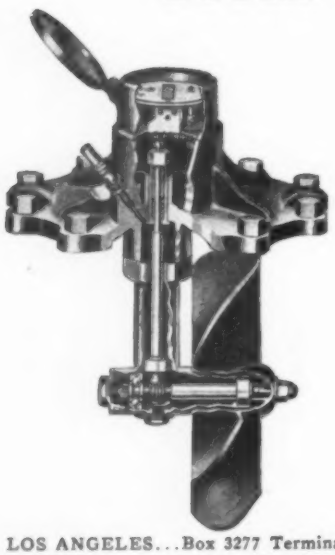
★ ★ ★ W. H. STEWART ★ ★ ★

P. O. B. 767 • Syracuse, N. Y.

SPARLING

MAIN LINE WATER METERS

From ICELAND to HAWAII



In training camp and defense plant; in municipal waterworks and industrial operation, the SPARLING propeller-type Meter is measuring flows with consistent accuracy!

At left, the meterhead is lifted from the line and "cutaway" to show the DIRECT ACTION from the propeller to Totalizer.

Indication and Recording are optional.

Bulletin 308 will be sent upon request

J. W. SPARLING

LOS ANGELES...Box 3277 Terminal Annex
CHICAGO.....3104 South Michigan Ave.
622 Broadway.....CINCINNATI
6 Beacon Street.....BOSTON
101 Park Avenue.....NEW YORK

Structural Waterproofing Compounds, by Sika, are presented in a new folder from Sika, Inc., of Passaic, N. J. Amongst these are the integral waterproofing compounds for mixing in concrete and mortar. Then there is a Gunnite Sika and a Grout Sika and Sika Quick Setting Compounds. Sika's Plastiment referred to as "The Vitamin for Concrete," is a powder offered for production of stronger and denser concrete while increasing the plasticity and workability of concrete mortars. For a copy of "Sika Structural Waterproofing Compounds and Plastiment," write Sika, Inc., Passaic, N. J.

Power and Distribution Transformers and other electrical distribution equipment by Allis-Chalmers are completely described in a new bulletin just issued to cover the entire A-C line of such equipment.

The new bulletin discusses important wartime considerations such as the use of modern welded construction and standardization of design, which saves vital materials in manufacturing and provides the advantages of interchangeability in installation.

The new electro-cooler for increasing transformer capacity, and unit substations which simplify power control and distribution are two new developments treated in this bulletin. Others included are feeder voltage regulators, instrument and metering transformers, the oil-sealed inert gas system which protects transformer oil by isolating it from the outside air, and load-ratio-control for load regulating voltage, power factor and phase angle.

Copies of Bulletin B-6186 may be had from the Allis-Chalmers Mfg. Co., Milwaukee, Wis.

BUY

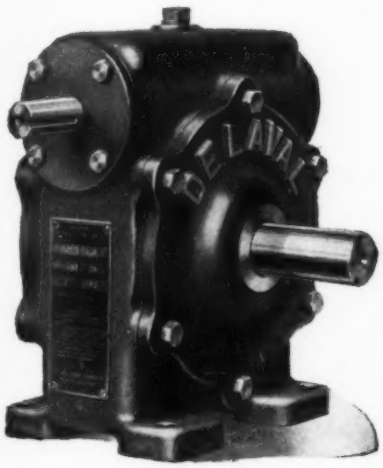
WAR BONDS

EQUIPMENT NEWS

De Laval Small Worm Gears With One-Piece Casings

A great variety of motor-driven industrial equipment, such as mixers, dryers, small conveyors, mechanical stokers, etc., requires only small power, but, as small electric motors run at high-speeds, speed reducers are necessary. The small worm gears here shown are produced by the De Laval Steam Turbine Co., Trenton, N. J., for ratios of 3⅝ to 1 up to 60 to 1 and in 3 inches and 3½ inches center distances.

These new worm gears are distinguished by having casings cast in one piece, the casing with side plates totally enclosing the working parts and serving as an oil reservoir from which the bearings and gear teeth are lubricated. The interior is accessible upon removing one of the side plates, although the only attention required is checking the oil level at long intervals, for which purpose a gage cock is provided. The worm shaft is carried on ball bearings and the wheel shaft on Timken bearings. The worm and worm shaft are of carburized nickel steel, heat treated after machining, while the worm wheel is of chill-cast bronze with hobbed teeth. The units are supplied for either top or bottom drive, with shaft extension to either right or left, or in both directions. The lower ratios can be used as speed increasing gears up to a maximum speed of 2,000 revolutions per minute.



Top Drive Gear

For additional information, address De Laval, Trenton, N. J.

New Midget Explosion Proof Pump

A new midget size Motor-Pump that is of explosion proof construction has recently been announced by Eastern Engineering Co. of New Haven, Conn.

The main features of this unit are: (1) explosion proof motor, which is Underwriters' approved; (2) compact

SMITH
TAPPING MACHINES
THE A.P. SMITH MFG. CO. EAST ORANGE, N.J.
Symbol of Quality Since 1889
PROTECTOP
Trucks and motor cars back into fire hydrants every day. When this happens to a Smith Protectop Hydrant the break occurs only at one place and the only parts needing replacement are the frangible standpipe clamp and the frangible cast iron stem section. These parts cost comparatively little and they make it easy for full repairs in 15 minutes. The valve is of the compression type and even should it be open at the time of the break, it will instantly close, preventing any possibility of flooding. Made in all sizes and types.
OTHER SMITH PRODUCTS
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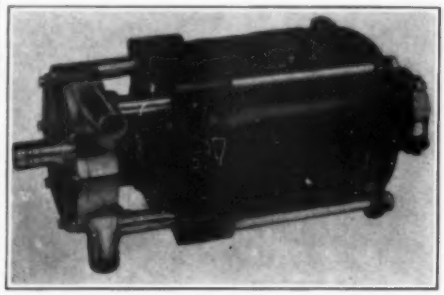
size and construction; (3) its capacity for continuous duty operation; (4) performance characteristics in relation to size.

The size of the complete unit, which requires no coupling because the motor



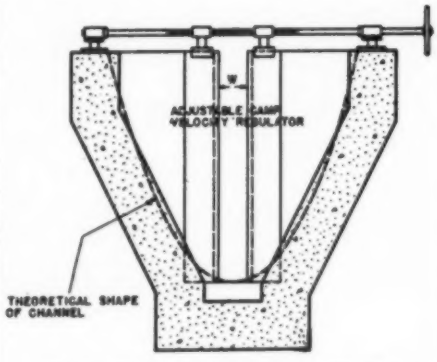
armature and impeller are mounted on a single shaft, is only 10 in. long, 5½ in. high and 5 in. in width. The complete unit weighs but 18 pounds; has an 1/12 H.P. explosion-proof G. E. 110 or 220 volt motor; builds pressure to 16 lbs./sq. in. and has a capacity of 5.7 gals./min. at top delivery.

For descriptive literature on this economically priced motor-pump unit write Eastern Engineering Co., 45 Fox St., New Haven, Conn.

The Camp Regulator for Grit Chamber Operation

The Camp Regulator for control of grit-chamber velocities is being offered by the American Well Works of Aurora, Ill.

This device for controlling velocity of flow through grit chambers, in order to regulate the efficiency of grit separation and the quantity of grit to be



Cross Section of Channel (Outlet End)

disposed of, was conceived and developed by T. R. Camp, Assoc. Professor of Sanitary Engineering at Boston Tech.

By varying the width "W" of the opening through the regulator plates any desired velocity will thereafter be maintained over the entire range of flow.

Advantages listed for the Camp Flow Regulator include (1) lower head loss than through a Sutro weir; (2) accurate control of grit chamber velocity over entire range of daily flow; (3)

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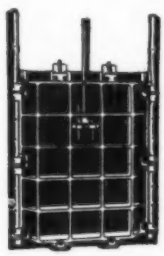

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In all of the hundreds of installations made for Military and Naval needs in the rush for troop training and war need manufacturing, not one has failed. At present nearly 100 percent of Layne production and service is for war necessity but every effort is being made to repair and keep private and municipal installations in operation.

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WORLD'S LARGEST WATER DEVELOPERS

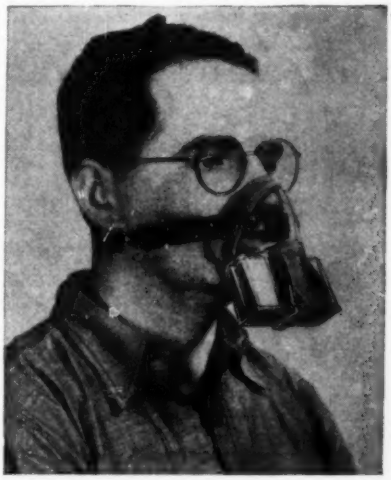
change in setting (chamber velocity) is made by simple adjustment; (4) can be used as flow measuring units also.

Bulletin No. 249 presents more detail concerning the Camp Regulator. For a copy, write the American Well Works, Aurora, Ill.

New Model Respirator

The widely used aluminum model Dustfoe Respirator, manufactured by Mine Safety Appliance Co., is now available in an all-plastic model, approved by the U. S. Bureau of Mines. Known as the Clear-Vue Model Dustfoe, it is an efficient, compact, lightweight respirator made of transparent plastic—durable, odorless, non-corrosive, and a non-conductor of electricity and heat.

The Clear-Vue's transparent construction makes possible the inspection of the filter for proper insertion and seal without removal from the respirator. A plastic catch on the filter case locks positively in place only when the filters are in the correct position. The self-adjusting facepiece has a new form-molded sponge rubber face cushion. An army-type exhalation valve provides immediate drainage of any condensation from the facepiece.



The Clear-Vue Dustfoe requires little maintenance. It can be completely disassembled without tools in a few seconds. With the exception of the single filters which permit a fresh new filter with each cleaning, all parts of the Clear-Vue are inter-changeable, and can be washed and sterilized.

Headband "hardware" of the unit is also of plastic. The unit is comfortable to wear and permits unobstructed downward and sidewise vision. Goggles or head coverings can be worn without interference.

A leaflet giving full details on the Clear-Vue Dustfoe Respirator can be had by requesting Bul. CM-6 from Mine Safety Appliances Co., Braddock, Thomas, and Meade Sts., Pittsburgh, Pa.

New Cramer Reset Timers

Two new Cramer synchronous motor driven timers of the reset type

· 1879 ·
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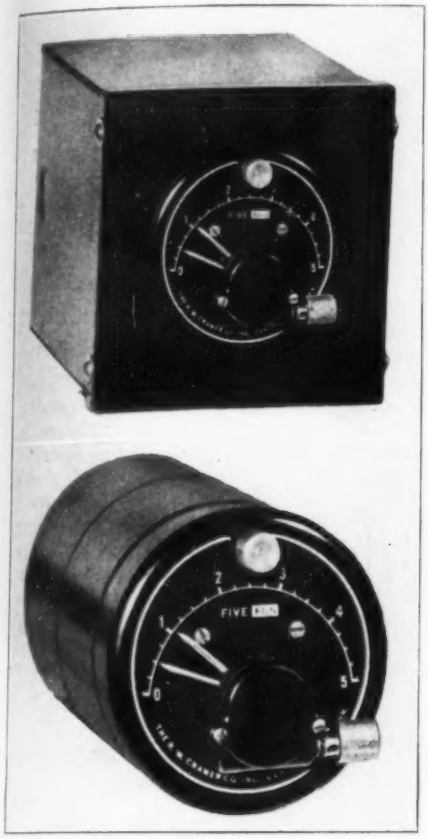

Cramer Reset Timers
(RS5 above RS4 below)

unexpired time cycle as well as the setting time.

The RS4 timer has a double throw switch and opens or closes the circuit, depending upon the choice of circuit, and starts by pressing and then releasing the start button, which also resets the timer. The RS5 is different in that it is mechanically held in a neutral position when the button is depressed, and it starts the timing cycle by pulling the start button outwardly.

These timers operate a single pole, double throw switch with a capacity of 10 amperes at 115 volts or 5 amperes at 220 volts A.C. non inductive load, and will control a one-third H.P. motor load, a heater load of up to 1200 watts, a lamp load of up to 250 watts or a relay load which does not exceed 15 amperes inrush at 115 volts A.C.

For further information write The R. W. Cramer Company, Inc., Centerbrook, Conn.

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WITH THE MANUFACTURERS

Unusual Dual Award of Army-Navy "E" is Made to Wallace & Tiernan

One of the few occasions at which two Army-Navy "E" Awards have been made jointly to the men and women of the two associated companies took place Monday afternoon, January 25th, at the plant of the Wallace & Tiernan Co., Inc., and Wallace & Tiernan Products, Inc., in Belleville, N. J.

Colonel J. S. Seybold, Chief of Procurement Section, Office of the Chief of Engineers, Washington, D. C., made the award to the employees of Wallace & Tiernan Co., Inc., for excellence in production. At the same ceremony, Colonel Harry A. Kuhn, Chief, Control Division of the Chemical Warfare Service, conferred a similar honor on the men and women of Wallace & Tiernan Products, Inc. On behalf of the Navy, Lieutenant Colonel C. H. Shuey of the U. S. Marine Corps, presented to management and employee representatives the "E" lapel insignia emblematic of the award.

Among the invited guests also seated on the platform during the ceremonies were some fifty officers of the United States Armed Forces.

Wallace & Tiernan Co., Inc., and Wallace & Tiernan Products, Inc., are now predominantly engaged in war production, but their products have different fields of application for the armed services. The two awards were achieved as a result of two separate records of excellent production performance on the part of the management and employees of the associated companies.

Wallace & Tiernan Co., Inc., came into the war period with a record of more than twenty years of production closely related to public health and safety, as the world's largest manufacturer of apparatus for sterilizing water supplies. Wallace & Tiernan Products, Inc., includes in its production pharmaceuticals and other products having a vitally important relation to public health.

In reviewing the records of the Wallace & Tiernan Cos. stress was laid on the happy employee relations enjoyed by this company during its history and the consistent full hour-days of work by all employees in the war effort.

Colonel Harry A. Kuhn, Chief, Control Division of the Chemical Warfare Service, Mr. Charles F. Wallace, Vice-President, and Mr. Martin F. Tiernan, President, of Wallace & Tiernan Co., Inc., Lieutenant Colonel C. H. Shuey of the U. S. Marine Corps, Colonel J. S. Seybold, Chief of Procurement Section, Office of the Chief of Engineers, and Mr. James Mills, who represented the employees in accepting the "E" pennant and lapel insignia.

Glamorgan Pipe Receives Army-Navy "E"

Just as we are going to press a release received from the War Department tells of the selection of the Glamorgan Pipe and Foundry Co. of Lynchburg, Va., for the prized Army-Navy "E" Award, denoting excellence in production in the war program.

Glamorgan is one of the oldest names in C. I. pipe and fitting production in America. J. D. Capron, another well known name in C. I. pipedom, is Glamorgan's energizing President.

Peerless Makes Dan Rankin Acting Chief Engr.

Dan R. Rankin

Dan R. Rankin has been appointed Acting Chief Engineer of the Peerless Pump Div. of Food Machinery Corporation. He has been associated with the Company for five years and moves up from the position of assistant to the Chief Engineer.

Mr. Rankin holds both the degree of B.S. and M.S. from the University of California. He is credited with many developments and innovations in designs of Peerless Pumps and since the start of the war has devoted much of this time to solving engineering problems attendant to the adaptation of Peerless Pumps to new applications and use in many varied fields.

Continuous research in the field of hydraulics is being carried out under Mr. Rankin's direction in the recently enlarged Peerless laboratory.

R-S Products Elects Hopkins Vice-President

Ex-Navy Pilot in World War I

D. W. Hopkins

David W. Hopkins, secretary and director of the R-S Products Corporation, Philadelphia, Pa., for a number of years, has been elected vice-president of that corporation. This announcement followed a recent meeting of the Board of Directors. He will continue in charge of the company's Valve Division.

Mr. Hopkins was graduated from the University of Pennsylvania as a Mechanical Engineer. He later took postgraduate work in aeronautical engineering at M.I.T. and served as a Navy flier in the last war.

Boardman of Chicago Bridge and Iron Wins American Welding Medal

H. C. Boardman of Chicago Bridge and Iron Co., has recently been

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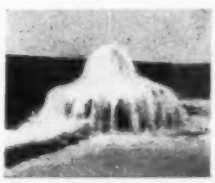

WRITE FOR INFORMATION

awarded the Samuel Wylie Miller Memorial Medal, coveted prize of the American Welding Society.

Mr. Boardman, as medal winner, was cited for his contributions to research, standardization and advancement of welded construction.

As immediate past-president of the Society, George T. Horton, Chief Engineer of Chicago Bridge and Iron Co., was amongst the first to congratulate Mr. Boardman on his winning of the prized Miller Medal.

M. C. Morgan

Becomes Byer's Ass't Pittsburgh Manager.

M. C. Morgan, formerly field service engineer, has been appointed assistant Pittsburgh division sales manager of A. M. Byers Co., according to an announcement by M. J. Czarniecki, vice president in charge of sales.

M. C. Morgan

Mr. Morgan, who has been with Byers since 1923, will be associated in his new position with H. R. Rowland, division manager.

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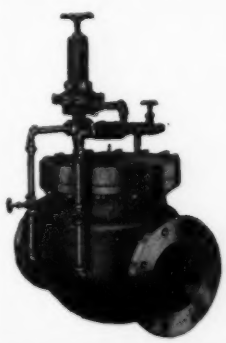

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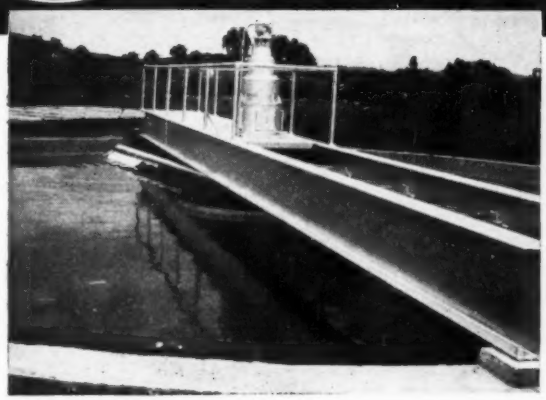

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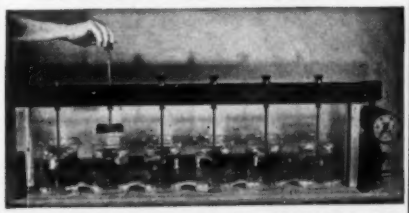

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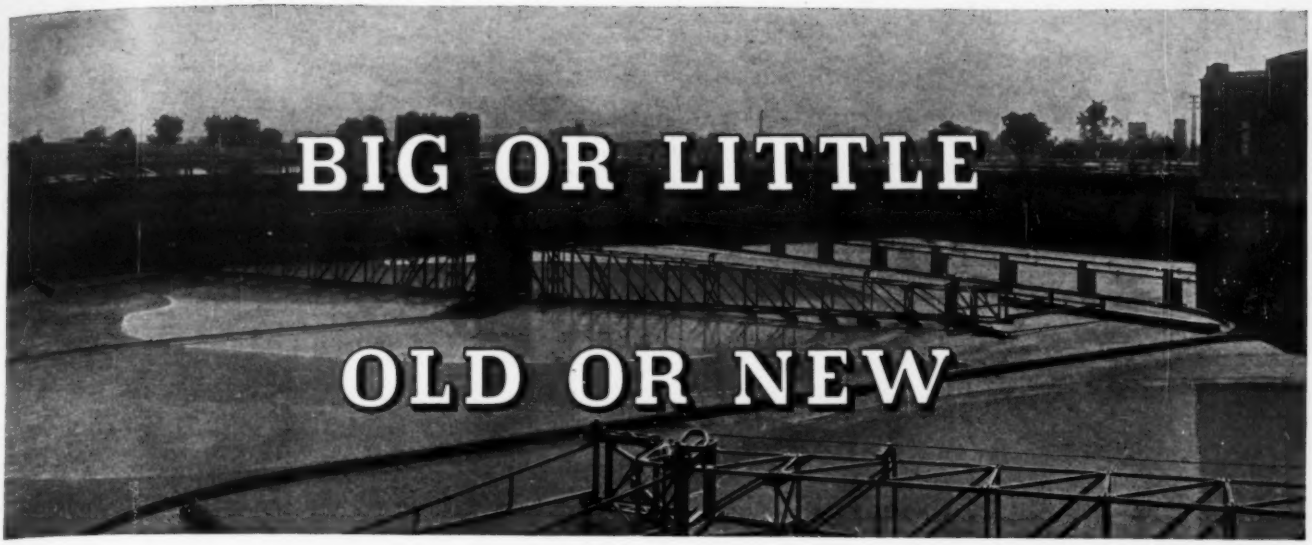

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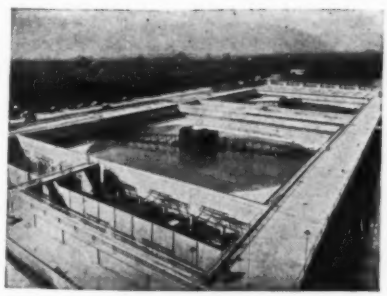


METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

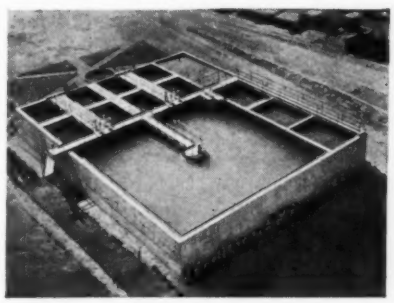
Type: Lime-soda process plus zeolite softeners

Capacity: 100 M.G.D.

Equipment: 2 Dorrco Flash Mixers, 2 Squarex Clarifiers and 2 units of Flocculators

Cons. Engrs.: Hoover and Montgomery, Columbus, Ohio.

SMALL PLANT—NEW CONSTRUCTION



FOLSOM STATE PRISON CALIFORNIA

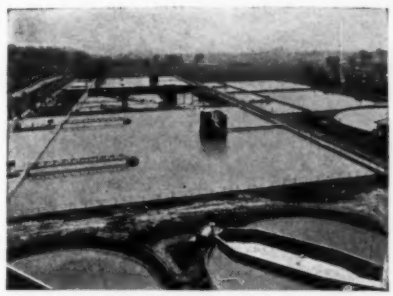
Type: Coagulation

Capacity: 2.0 M.G.D.

Equipment: Dorrco Flash Mixer, Squarex Clarifier and Flocculator

Design: Division of Architecture, Cal. Dept. of Public Works—W. H. Rockingham

BIG PLANT—EXISTING PLAIN TANKS



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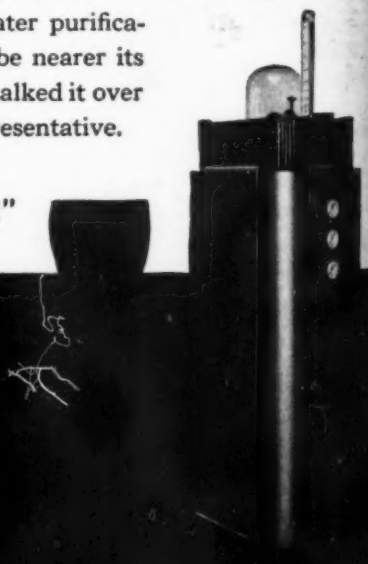

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